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Psychosocial Correlates of Decision Certainty in Academic Major Selection of College Students.

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PSYCHOSOCIAL CORRELATES OF DECISION CERTAINTY IN ACADEMIC MAJOR SELECTION OF COLLEGE STUDENTS

A Dissertation

Submitted the Graduate Faculty of the
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Agricultural and Mechanical College
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in

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by
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ABSTRACT

This study explored relationships between several psychosocial variables and academic major decision certainty. Specifically, the study purpose was four-fold. First, this study attempted to expand the traditional conceptual framework for understanding academic major selection by creating a new construct of academic major decision certainty. Second, incorporated in this study was development of new instruments to measure academic major decision certainty, student academic self-appraisal, and student academic major self-efficacy motivation. Third, this study utilized social cognitive theory to better understand academic major decision certainty as a complex, multi-faceted construct. Finally, because the sample utilized in this study extended to all subsets of the population, broader practical applications/implications were attained, and generalizability of the results extend beyond one or more small groups of student reflected in studies to date.

The study sample consisted of 853 undergraduate students attending Louisiana State University during the Summer 1999 semesters A and B. Five measures were used for data collection: Career Decision Making Self-Efficacy Scale (Taylor & Betz, 1983), Internal-External Locus of Control Scale (Rotter, 1966), Student Academic Self-Efficacy Motivation Scale, Student Academic Self-Appraisal Inventory, and Academic Major Decision Certainty Scale. The last three measures were developed specifically for this study.

Major findings of the study showed: a) self-efficacy, self-appraisal, and to a lesser degree locus of control are important elements of decision certainty; b) the constructs of academic major decision certainty and career decision making self-

efficacy are multi-dimensional; c) the variables studied, career decision making self-efficacy, student academic major-self-efficacy, self-appraisal, and decision certainty appear to be somewhat unstable over time; d) little relationship exists between presage variables (age, grade point average, undeclared major status, etc.) or between the presage variables and the psychosocial variables; e) career decision making self-efficacy and student academic self-appraisal are differentially related to dimensions of academic decision certainty, f) when the psychosocial variables were examined along with the more tradition variables in terms of their relationship to academic major decision certainty, the latter did little to explain or predict any variance in academic major status, and g) decision certainty can be conceptualized and measured as a multi-dimensional, continuous variable.

CHAPTER 1: INTRODUCTION

Overview

Questions about the nature of decision making have produced one of the most vigorous lines of research within vocational psychology, career counseling, and student development inquiry in recent years. In the higher education setting, career indecision as it relates to the selection of an academic major has received a substantial attention in the career and personal development literature. Despite the quantity of research and emphasis on indecision in the literature, several important questions remain unanswered. What is the nature of decision certainty? Why is there so much lack of decision certainty among college students? What does effective decision making entail? What are the consequences of lack of decision certainty for college students- academically, emotionally, financially, and developmentally? What are the consequences of lack of decision certainty on overall efficiency in institutions of higher education? How can decision certainty be measured? What role do personal factors play in decision certainty? Can a decision regarding the selection of an academic major be measured for quality?

Currently nearly 70% of high school graduates are enrolling in college within one year of high school graduation. It is also estimated that 45% of the adult population is attending or has attended college. Of these vast numbers, 50-70% of college students will be undecided, change their major, or experience difficulty related to vocational goals (Foote, 1980; Slaney, 1980; Titley, Titley, & Wolff, 1976). Indecision, in relation to the college major has been linked to increased risk for dropout which effects the

individual's earning potential among other factors. Titley & Titley's (1985) longitudinal study of students who switched majors during orientation found that after six years, 57% of those students never graduated and were no longer on college rolls.

Past research in higher education has focused on the investigation of career indecision as it effects college student development and indecision as an obstacle to retention of college students. Previous retention research of the decision making process involving college students' selection of an academic major has been almost exclusively focused on the undecided student for being at-risk for matriculation. Research has failed to look at major changers, the certainty with which initial and subsequent major selections are made, and the overall decision making process or personal/psychological factors related to degree of decision certainty.

Research of this nature is important because it is estimated that at most institutions, 50 to 75% of students in any entering class will be undecided or change their major prior to graduation. This group of students is the norm rather than the exception. Based upon these studies, initial reports about major selection should be viewed with skepticism (Lewallen, 1993). Trying to predict persistence on the basis of the initial major or career choice is extremely difficult. However, the literature has failed to address these issues. Additionally, little attention has been given to the process of how academic major selection decisions are made, and the degree of commitment to, and certainty with which an academic major selection is made. In a developmental context, academic major selection is often the first step a college student makes in forming career identity.

The Developmental Importance of Major Selection

Forming a career identity is a central component of all theories describing overall personal development and career development. Theories by Super (1957), Ginzberg, Ginsburg, Axelrod, and Herma (1951), and especially, Erikson (1959) and Chickering (1969), all share a common developmental perspective which stresses the importance of developing purpose by selecting a career. These theorists present development as a series of stages and tasks which must be accomplished along a natural progression. Each theory also includes a stage which covers the traditional aged college student and discusses career selection as a task to accomplish during that developmental stage. Examples include Erikson's "identity verses role confusion" stage, Super's "transitional" stage, and Chickering's "developing purpose" vector. Chapter two provides a thorough discussion of these developmental theories each of which views selecting a major as constituting the beginning of the process of establishing career purpose for the traditional college-aged student. This perspective also places career indecision in the context of normal development in young adults (Slaney, 1988). Therefore, it should be expected that students will experience some career indecision during the normal developmental progression of selecting a career and developing purpose. For this reason, research in the higher education setting focusing on undecided students has been plentiful.

Indecision Studies: Historical Perspective

In light of the importance of career indecision, it is surprising that major advancements in studying indecision did not occur until the last twenty years. Prior to

the late 1970's, the assessment of career decision making was characterized by either neglect or extremely simplistic approaches (Slaney, 1988). Little interest prior to that time focused on the actual decision-making process within the academic major selection process. Initially, studies focused primarily on the difference between decided and undecided students as a dichotomous variable (Osipow, 1983; Sepich, 1987). The dichotomous classification of decidedness in relation to college major selection has been prominent in the literature since Parson (1909) advised counselors to classify clients in two main categories of decided and undecided.

An historical review of career indecision literature performed by Slaney (1988) found that the dichotomous classification was utilized exclusively from the 1930's through the late 1970s and as a result he characterized most of the body of research as simplistic. The mid-1970's, according to Slaney (1988), brought a change in how researchers operationally defined indecision. Rather than a dichotomous state, indecision was viewed as an uni-dimensional continuum ranging from undecided to decided. Though the problem of defining indecision as a dichotomous state was beginning to be addressed, an additional dilemma remained. Students were still being viewed as a homogeneous group. With increased research in this area, the multidimensional quality of indecision began to be viewed as more probable. As indecision was found to have ". . . varied levels and forms demanding differing and often individualized approaches" (Danis , 1989, p. 412). Researchers developed categories for describing individuals experiencing career indecision, or uncertainty about what career options to pursue.

As a result of an extensive review of the literature on this construct, it is clear that undecided individuals have been categorized into three groups (Savickas, 1989). The first group consists of those individuals who feel no pressure to make decisions. Despite good decision-making skills and confidence that an appropriate choice would eventually be made, these individuals defer making a choice due to lack of information about their options. This group is viewed as making the developmentally appropriate choice to postpone commitment until more information is gathered. Van Matre and Cooper (1984) and Brown (1987) identified this type of uncommitted individual in their research as well. The second group of individuals experiencing career indecision consists of students who manifest a moderate degree of immaturity and anxiety about career decision making; experiencing moderate to severe indecision (Seligman, 1994). The third group of indecisive individuals consists of students who exhibit considerable immaturity in career development and are highly anxious about their inability to make a decision. Van Matre and Cooper (1984) referred to these individuals as undecided-indecisives because they are unable to make decisions, despite having the necessary information to do so.

The problem with this categories is that even those students who initially select a major, may be at risk, as it is estimated that between 50% and 70% of all college students change their major before they graduate (Foote, 1980; Slaney, 1980; Titley, Titley, & Wolff, 1976). According to Newman, Fuqua, and Minger (1990), many students who describe themselves as decided about their career choice still experience discomfort about their choice and have made a choice under pressure to fulfill the desire

to please others such as parents. They also appear to make the decision without enough information about themselves or the world of work (Newman, Fuqua, & Minger; 1990) and often they make choices that are tentative and subject to change. At most institutions, if students are targeted for assistance with major selection, it is often based upon their undecided status. This method provides no organized mechanism for assistance to those who have made a tentative decision or a premature choice. Additionally, this situation leaves those students who change their major without the benefit of targeted academic or career counseling (Steele, Kennedy, & Gordon, 1993).

Services which target major changers are needed in order to assist student with the emotional upheaval that is often experienced during the shift from one major to another. For example, upperclassmen often experience anxiety and confusion during the transition from one major to another because they have accrued credit hours that may not apply to the new major. These students often have not considered alternative majors. Gordon & Polson (1985), using the results of a national survey, found that the phenomenon of major switching is quite common, especially among students at large institutions. The absence of studies addressing major changers leaves a large deficit in the literature.

Titley and Titley's (1985) longitudinal study on students who switched majors during orientation supports this line of reasoning. After six years, 57% of students in their study never graduated and/or were no longer on college rolls. Students frequently change their occupational plans during the college experience. Feldman and Newcomb (1969) estimated that between one-third and two-thirds of all students will change

majors during college. Limited research exists on major changers, their reasons for switching majors, and factors that contribute to the decision making process involved in initial and subsequent major choices.

This study focused on factors contributing to academic major decision certainty and career decided and undecided students. According to Newman, Fuqua, and Minger (1990):

> It is highly likely that a premature commitment to career choice may prove to be more expensive in both human and economic terms than would a developmentally delayed career choice. Furthermore, an uncomfortable commitment to a career choice could in many respects be less functional than the delay of a career choice" (p. 179).

It is a serious error to assume that entering college freshmen are either decided or undecided about a major. Rather, research might be better focused on the degree of certainty with which a student has selected a specific major. The degree of certainty among those who enter a specific major is highly variable and seems to be a factor in persistence and matriculation of students changing majors (Titley & Titley, 1985). However, the typical research design has compared decided to undecided students with little attention to the depth of decision certainty and little focus on theory-based variables potentially contributing to decision certainty. This study was designed to address these concerns.

Higher Education Attendance and Matriculation

Increasing numbers of graduating high school seniors are continuing in higher education. According to the Bureau of Labor Statistics, the incoming freshmen class has never been larger. 67% of the 1996-97 high school graduates were enrolled in

college by October, 1997. At the same time, institutions of higher education are retaining and matriculating fewer students. *College Dropout Rate Hits All-time High* reads the headline of the July 11, 1996 issue of USA Today. This article outlines a report issued by American College Testing that conveys that the dropout rate for first-year college students has hit a new high, while the percentage of students graduating within five years is at an all-time low. Alarming statistics like these raise concerns about the retention and matriculation of college attendees.

According to the U.S. Census Bureau, in 1994, 45.2% of the adults in the United States had attended or were attending college (1994). Retention studies target reasons for the discrepancy between the numbers entering colleges and those obtaining a degree. Undecided college students have long been identified in the retention literature as a high-risk population for dropout from college (Abel, 1966, Astin, 1971, Beal & Noel, 1980; Gordon, 1985). In most institutions of higher education, a large percentage of students remain undecided until the first half of their sophomore year (Raskin, 1987). Even students, who initially select a major, may be at risk. It is estimated that between 50% and 70% of all college students change their major before they graduate (Foote, 1980; Slaney, 1980; Titley, Titley, & Wolff, 1976).

Muskat (1979) suggested that "personal commitment to either academic or occupational goals is the single most important determinant of college persistence" (p.20). Noel (1985) stated that "uncertainty about what to study is the most frequent reason talented students give for dropping out of college" (p.11). Without selecting a major, academic success becomes far less likely because the lack of a clear academic

and career focus is a causal factor in increased attrition (Simms, 1983). There is a large body of literature to support the notion that undecided students are at-risk for not completing college (Abel, 1966; Ashby, Wall, & Osipow, 1966; Beal & Noel, 1980; Daubman & Johnson, 1982; Elton & Rose, 1971; Foote, 1980; Gordon, 1985; Muskat, 1979; Smitherman & Carr, 1981; Titley & Titley, 1980).

The concern for graduating college students goes far beyond the need for accountability by institutions of higher education. The social and economic mobility beliefs reflected by the American Dream concept is that education provides opportunity for success and an increased quality of life (Mickelson, 1990). "There is abundant evidence that the completion of a bachelor's degree is central to the determination of both occupational status and income" (Pascerella & Terenzini, 1991, p. 370). For many occupations, possession of a college degree is a prerequisite for entry into the vocation. Therefore, college has an important impact on the type of occupation one enters. The financial benefits of college attendance and graduation with a bachelor's degree are significant. To paraphrase the March, 1998 issue of Postsecondary Education Opportunity, the only thing more expensive than going to college is not going to college. Without the education and training that higher education provides, the youth of today simply do not have access to the best paying jobs the economy has to offer.

According to the United States Census (1990), increases in educational levels also reflect increases in earning capacity. In the current economy, the sad reality is that obtaining a high school diploma provides little job opportunity. The average earnings of an individual possessing a high school diploma are $20,000. The average earnings of

a college graduate are $31,000. The disparity in earnings becomes more significant as advanced degrees are earned (masters' degree holders earn $39,000 and those with doctorate/professional degrees average $50,000). Furthermore, information from this source provides strong support, from an economic standpoint, that targeting groups at risk for college drop out is important. Individuals with some college course work, but no degree, earn on the average $23,000. Specific figures from the U.S. Census Bureau provide support for the economic returns on investing in a college education. In 1995, a male graduate earning a bachelor of science degree from a 4-year institution will earn over the course of a 40-year career of employment $700,000 more than an individual with a high school degree only ($400,000 for female graduates).

The return on investment for college costs as of 1995 is at the rate of $28.40 for every $1 spent on higher education. Since 1967, the figure holds true fluctuating between $38 and $28 dollars over the last 30 years. Consequently, persistence in education and formal completion of the undergraduate degree are necessary conditions for degree attainment, access to certain vocations, and increased earnings across the life span (Kocher & Pascerella, 1988; Tinto, 1987).

The above factors have contributed to the public demand for increased accountability from colleges and universities regarding the retention and graduation of students at the undergraduate level. Due to current circumstances, an increased need for research and retention programs aimed at facilitating the matriculating of individuals at high risk for drop out, such as those struggling with major choice, has risen. Studying the process of decision making for college students and focusing on the academic major

selection once it has been made are two ways to achieve that goal. This study extends conceptual and measurement perspective, related to this goal.

Decision Making

In order to investigate decision certainty of major choice as a primary factor in the retention and matriculation of college students, it is necessary to relate this decision task to overall decision making as decided by established theory. From an extensive review of the literature on decision making, Janis and Mann (1977) derived seven major criteria that can be used to determine whether decision-making procedures are of high quality as follows:

> The decision maker with the best of his ability and within his information processing capabilities: 1)Thoroughly canvasses a wide range of alternative courses of action: 2) Surveys the full range of objectives to be fulfilled and the values implicated by the choice; 3) Carefully weighs whatever he knows about the costs and risks of negative consequences, as well as positive consequences, that could flow from each alternative; 4) Intensively searches for the information relevant to further evaluation of the alternative; 5) Correctly assimilates and takes account of any new information of expert judgement even when the information or judgement does not support the course of action he initially prefers; 6) Re-examines the positive and negative consequences of all known alternatives, including those originally regarded as unacceptable, before making a final choice; 7) Makes detailed provisions for implementing or executing the chosen course of action, with special attention to contingency plans that might be required if various know risks were to materialize. (p.11)

The criteria outlined above prompted Janis and Mann, (1977) to create a comprehensive decision-making model which is discussed at length in Chapter 2.

Another comprehensive model of decision making was developed by Tiedeman and O'Hara (1963). Based upon the theory of career development as well as that of decision making, this model places the career decision making process within the

context of an individual's career and psychosocial development. This model emphasizes an occupational decision making paradigm within the developmental perspective of career choice postulated by Super, but adds emphasis on the characteristics of individual decisions.

Harren's (1979) model of career decision making uses Tiedeman and O'Hara's (1963) model as its base, but is specifically geared to traditional aged college students. Theoretically the model utilizes the decision-making theory of Janis and Mann (1977) within the student development theory of Chickering (1969). The self-concept aspect of the theory is derived from the work of Super (1963). Harren limits his model to the typically aged undergraduate student by identifying three student development tasks adapted from Chickering (1969): autonomy, interpersonal maturity, and sense of purpose. An introduction to this model follows. A more in-depth discussion can be found in Chapter 2.

The Harren Model of Career Decision Making

The Harren Model of Career Decision Making is comprehensive in that it takes into account many of the important parameters involved in career decision making and career development (Harren, Daniels, & Buck; 1981). Due to the focus of this study on cognitive and affective processes, the parameters included in this model relevant to the current research are: the stages of the decision making process that the decision maker passes through; the decision making style characteristics of the decision maker; the developmental tasks appropriate to that stage; and the environment/ social and interpersonal conditions that exist. The core of the Harren model is a four-stage

sequential, decision-making process through which an individual progresses in making and carrying out decisions. These stages are awareness, planning, commitment, and implementation.

Both decision making and career development stage models address the re-cycling of individuals through stages when faced with additional decision or vocational challenges. This recycling also occurs, as discussed in the Harren Model, when a tentative or premature decision is made. By investigating the decision certainty (degree of commitment to and contentment with) with which a decision is made, negative consequences associated with inappropriate and inadequate decision can be avoided.

The Case for Decision Certainty

A need exists to better conceptualize and measure decision certainty as a complex multi-dimensional continuous variable. The decisional process often involves stress or anxiety within the individual as conflict between alternative choices occurs. As a result of the negative emotional states - doubts, worry, anxiety, outside influences, internal desires- associated with the need to make a decision, individuals will seek to reduce or eliminate the states. Methods used to accomplish this goal include procrastination, rationalization, denying responsibility for making the choice, and rushing to make a choice just to have it accomplished. According to Janis and Mann (1977), man is vulnerable to making gross errors in arriving at a decision through the use of biased information processing and superficial search. Additionally, the self-appraisal component needed to facilitate effective decision making is often undertaken at a superficial level.

The concept of commitment is central to most psychological formulations of the decision making process (Janis & Mann, 1977). The dynamics of commitment extend beyond the act of making a decision to post-decisional stability. The component of contentment with the decision is also central to reducing negative consequences and maintaining positive feelings associated with the decision.

Understanding the nature of decision certainty is a central component in this study. A review of the decision-making literature and the nature of indecision research in the higher education context established the need for conducting research aimed at understanding the quality of academic major selection methods. The need to move beyond studying college students based only on their decided or undecided status has been established. In order to impact broader issues such as student matriculation and development, a priority of this study was to focus on factors that contribute to decision certainty about the selection of an academic major.

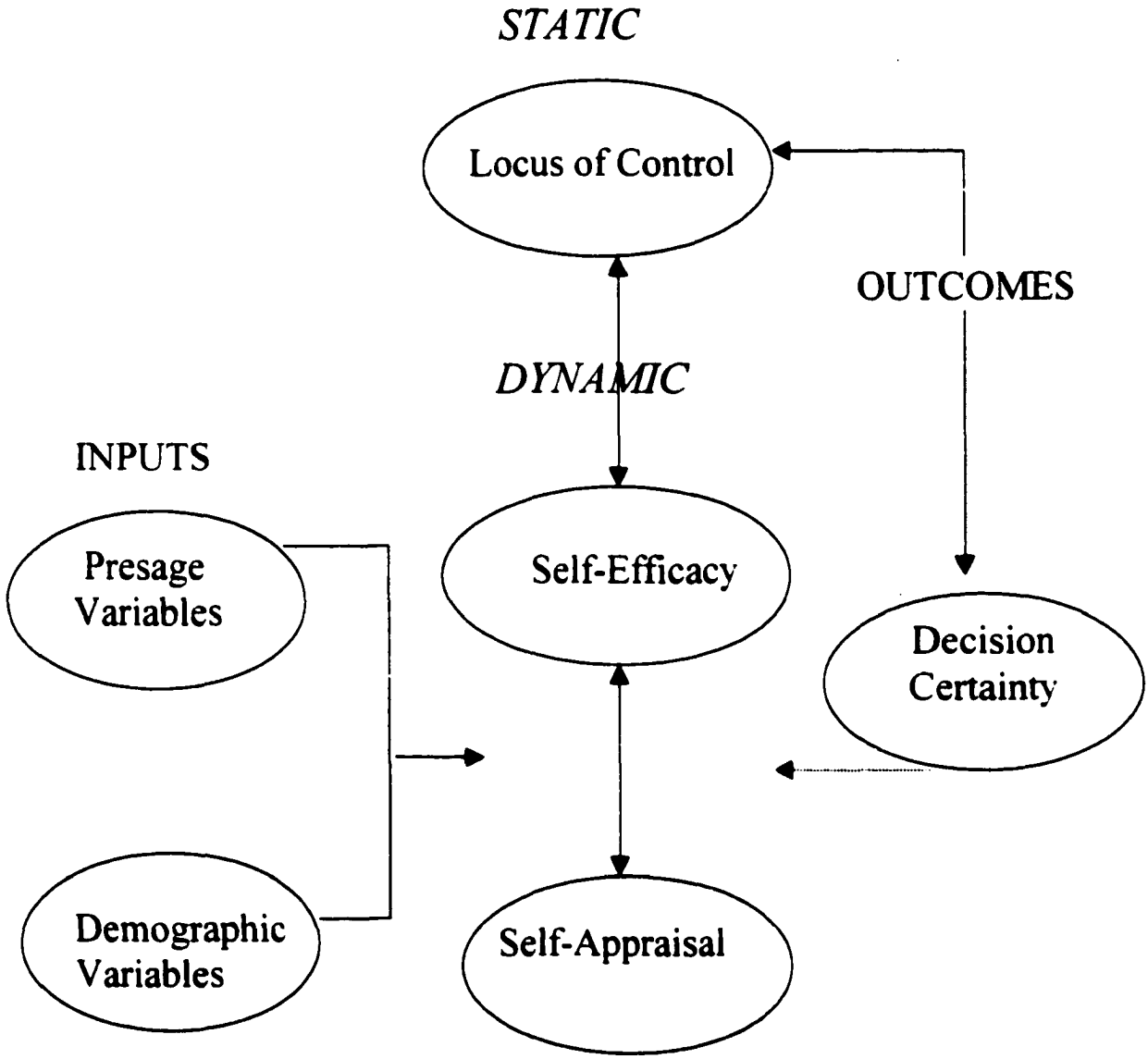
Decision certainty regarding an academic major, was viewed within the framework of developmental and individual differences that motivate individuals to engage in the active process of decision making. The role of self-efficacy and locus of control within this process deserved attention because these constructs are self-perceptions that mediate linkages between cognition and behavior. Self-efficacy, locus of control, and self-appraisal within the decision making process were expected to contribute to decision certainty. Therefore, the role of these variables was studied. A discussion of these theoretical constructs that guided this research and the conceptual model developed follows.

Theoretical Constructs

Although no study had yet been conducted to examine the relationship between self-efficacy, self-appraisal, locus of control, and decision certainty in the selection of an academic major, the variables of self-efficacy, locus of control, and self-appraisal have been linked to career decision making and choice. The theoretical framework of each of these constructs, the relationship of each construct in the decision making process, and the relationship each construct to decision certainty is presented briefly in this section along with a conceptual model illustrating the relationships among the variables. Additional coverage of each is presented in the review of the literature in Chapter 2. Figure 1 shows a conceptual framework of the study.

Conceptual Model Framing the Study

In order to better conceptualize and measure decision certainty as a complex multi-dimensional continuous variable, a conceptual model was developed. Included in the model are constructs related to developmental and individual differences that motivate individuals to engage in the active process of decision making. The constructs of self-efficacy, locus of control and self-appraisal, which act as mediating variables, are believed to contribute to decision certainty. Self-efficacy is derived from social learning theory and refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments. Locus of control is also derived from social learning theory and refers to the extent of one's beliefs that personal behavior is caused by internal or external factors. Self-appraisal refers to a system of internal assessment and evaluation encompasses engaged in when options related to certain



Solid arrows in the figure depict recursive relationships among variables.
Broken arrows depict non-recursive relationships among variables

Figure 1:

Conceptual Framework for the study

decision choices are considered. These variables are shown in Figure 1 between student presage variables and decision certainty.

The figure depicts student presage variables and demographic characteristics as inputs in the decision making process (e.g., age, gender, ethnicity, grade point average, academic aptitude). Linkages between these input variables and degree of decision certainty, as previously mentioned, are mediated by the personal variables of self-efficacy, self-appraisal, and locus of control.

The mediating variables in this study include both static and dynamic processes. Locus of control, for example, is considered a static variable because the extent of an individual's beliefs that personal behavior is caused by internal or external forces is considered to generalize across various tasks and situations. It is a more global and constant self-perception consistent with personal traits and states of the individual. On the other hand, self-efficacy and self-appraisal are considered dynamic processes. Both processes are marked by continuous and productive activity and change as sources of information are filtered through current perceptions, knowledge about self, and the individual's interaction with situations and tasks.

As the model illustrates self-efficacy, self-appraisal, and locus of control within the decision making process were expected to contribute to decision certainty. The rationale for selecting these variables reflected two concerns. First, the extant literature has almost exclusively focused on linking student presage and demographic variables (e.g., grade point average, parental education level, etc.) to decision certainty dichotomies (i.e., decided versus undecided). Secondly, exploring the self-efficacy and

locus of control variables could add considerably to the development of an expanded theory base to understand degrees of decision certainty and their personal/psychological correlates. The locus of control and self-efficacy variables examined in this study had not yet been studied empirically in the academic major decision certainty literature.

Rationale for Utilizing Psychosocial Variables

Career development theory has historically suggested that self-appraisal and information gathering activities are thought to be instrumental in fostering the progress of vocational choice (Super, 1957). As such, Blustein (1989) more recently has suggested that studying personal variables, such as self-efficacy perceptions, as they pertain to the vocational choice context is relevant due to the close relationship between exploratory activities and career decision making. Therefore, it was expected that personal variables like self-efficacy and locus of control would contribute to decision certainty.

"Social learning theory emphasizes the prominent roles played by vicarious, symbolic, and self-regulatory processes in psychological functioning." (Bandura, 1977, p.vii). Social learning theory postulates that behavior, personal, and environmental factors interact and operate as interlocking determinants of each other. "In the social learning view, people are neither driven by inner forces nor buffeted by environmental stimuli. Rather psychological functioning is explained in terms of a continuous interaction of personal and environmental determinants." (Bandura, 1977, p.11).

Lewin's (1947) forced-field theory provides the initial theoretical framework for these interactions. According to Lewin, $B = f(P, E)$, where individual behavior (B) is a

function of personal variables (P) and environmental variables (E). This model was expanded upon by postulating an interaction between personal and environmental variables where B=f (PxE) (Bowers, 1973; Endler and Magnusson, 1975). Lewin was the first individual to envisage an analysis of decision making in terms of psychological conflict. Lewin's work focusing on the psychological aspects of social commitment to a decision, was the basis for Festinger's (1957) theory of cognitive dissonance.

This theory was important within the context of this study because it focuses on the need to ward off the stress of post-decisional conflict. An important variable in determining individual commitment to a decision is the individual's perception of the degree of freedom of choice among viable alternatives, foreseeable knowledge of consequences of actions, and level of responsibility for making the choice during and prior to the time of commitment. "A necessary condition of dissonance reduction is the decision maker's realization that he has made a choice freely, which makes him feel personally responsible for his judgements and actions" (Janis & Mann, 1977, p.247).

Lewin's theory was also the foundation for Bandura's (1977) construct of reciprocal determinism. According to Bandura, an individual's behavior is not simply a result of environmental influences or of an individual's interpretation of environmental events. Rather, an individual's behavior is a product of the reciprocal interaction of cognitive, behavioral, and environmental factors. In this scheme, a) personal attributes such as internal cognitive states and physical attributes, b) external environmental factors, and c) overt behaviors all operate as interlocking mechanisms that affect one another tri-directionally. Thus, the interaction between students' personal/psychological

characteristics, their behavior, and their experiences in higher education (and other) settings represents a dynamic triadic reciprocal causation system (Bandura, 1997) that influences decision certainty. This system is reflected in Figure 1.

Social learning theory applications, specifically the concepts of self-efficacy and locus of control were of major concern in the current research. Of interest was the relationship these variables have on self-appraisal within the decision making process of making a major choice and the decision certainty with which that choice is made. The concept of cognitive dissonance as it relates to these applications provided a rationale for the inclusion of these variables.

Self-Efficacy

Bandura (1997) uses the term "self-efficacy" to describe beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments. Self-efficacy is not concerned with ability level, but rather with internal judgements the individual possesses on what s/he can accomplish with those skills (Bandura, 1986).

Self-efficacy theory states that the level and strength of self-efficacy will determine 1) whether or not a behavior will be initiated, 2) how much effort will result, and 3) how long the effort will be sustained in the face of obstacles. Self-efficacy serves a regulatory function for behavior which provides individuals with the ability to influence their own course of action and alter their environments (Pajares, 1996). We make life decisions according to our perceived self-efficacy by undertaking activities and choosing situations we judge to be within our capabilities for success or avoiding

those where failure is expected (Bandura, 1993). Self-efficacy mechanisms are posited to be major mediators of choice and development. Therefore, investigating linkages between self-efficacy beliefs and students' academic major decision certainty is a primary focus of this study.

People tend to undertake those tasks that they judge themselves to be capable of performing while avoiding activities that they regard as beyond their abilities. Thus human behavior is also strongly influenced by how we perceive our potential effectiveness in coping with the demands of the environment (Ewen, 1988). This concept is known as perceived self-efficacy. When individuals have a strong sense of perceived self-efficacy, they put forth a greater effort to accomplish a task despite the external obstacles they encounter. In contrast if one doubts ability, one is less likely to exert great effort. It is this aspect of motivation for a specific task or behavior that was of interest in the present study. It was believed that students who have higher levels of self-efficacy for career decision making would be more successful at reaching decision certainty in the selection of a major.

According to Bandura, (1997) efficacy expectations develop and are motivated by four sources of information: a) enactive mastery experiences b) vicarious experiences, c) verbal persuasion, and d) physiological and affective states. These four sources of information constitute the building blocks of self-efficacy and are utilized in the career decision making process. The four sources provide the information needed to influence a student's motivation to persist in the academic major selection process and attainment.

Self-efficacy was first applied to career development by Hackett and Betz (1981). The researchers determined that self-efficacy might be an important variable to include in models of career development since has research has shown the construct to influence achievement behavior, academic and career decisions and career adjustment. Though past research strongly suggested the role of self-efficacy in the context of career choice, Betz and Hackett (1986) noted that the role of self-efficacy in influencing the process of career decision making had received little attention. The importance of self-efficacy construct in the application to vocational behavior is that it incorporates the "phenomonological basis of Super's ideas about the self-concept" (Betz, 1994, p. 36) and is also embedded within social learning theory.

Self-efficacy has since been positively correlated to the career decision process (Betz & Hackett, 1981; Taylor & Betz, 1983; Lent et al., 1986). Taylor and Betz (1983) theorized that individuals fail to engage and persevere in career decision making activities because of low self-efficacy in relation to the process itself rather than because the decision making process produces anxiety (Kaplan & Brown, 1987). Inability to commit to a career decision has typically been found to be due to a low sense of self-efficacy about one's ability to make good career decisions (Seligman, 1994; Taylor & Betz, 1983). Taylor and Betz (1983) also found that students who had yet to make a commitment to a career had significantly less confidence in their ability to perform decision making tasks than did their peers who had chosen a career.

Self-efficacy has also been linked with the ability to consider vocational options, to engage in educational and occupational information gathering, goal planning, and

decision making. Since past research showed that the inability to commit to a career decision was typically due to low self-efficacy about one's ability to make good career decisions, it was expected that decision certainty in the major choice was also related to self-efficacy levels. As shown in Figure 1, as students' self-efficacy beliefs about their abilities to make decisions increases, their degree of decision certainty about the academic major selection also increases. In turn, as degree of decision certainty increases there is a resulting gain on the strength of students' efficacy beliefs about the ability to make decisions. Students' motivation and persistence to overcome obstacles and barriers to making decisions is enhanced as well.

Locus of Control

Locus control was defined as the extent of one's beliefs that personal behavior is caused and reinforced by internal or external factors. External control of reinforcement refers to the belief that events are caused by factors beyond an individual's control. Internal control of reinforcement refers to an individual's belief that events are contingent on one's own ability or behavior (Rotter, 1966). Individuals who have an internal locus of control have been found to exert more energy to a task due to intrinsic motivation and reinforcement. These individuals are personally invested in the process because success is attributed to personal resource exertion not outside factors such as fate or luck.

As it relates to career choice, an individual's locus of control would indicate the degree to which an individual takes responsibility for career decision making as opposed to projecting responsibility outward toward peers, authority, etc. Locus of

control had been linked to college student career development. Recent studies have revealed significant relationships between college students' locus of control and various measures of career development (Noe & Steffy, 1987; Frederich, 1988; Luzzo, 1993 a, b, c). Students with an internal locus of control exhibit higher levels of career development then students with an external locus of control. This relationship exists in the areas of career exploration activities, career expectations, vocational identity, and career decision-making skills and attitudes. An external locus of control has also been linked to career indecision (Cellini, 1978; Hartman & Fuqua, 1982; Taylor, 1982).

Therefore, it is reasonable to assume that individuals who depend solely on external influences may become so compliant and make no choice at all or will depend wholly on others to make decisions for them. **External** locus of control may explain why many individuals who have made a career choice still experience discomfort related to the choice and make the choice under pressure from external forces. Conversely individuals with an **internal** locus of control should experience less uncertainty in the major selection process due to collecting enough information about themselves and the world of work prior to making a decision. Establishing how locus of control differs from self-efficacy is of conceptual significance since both variables reflect a focus on individual's perceived capabilities.

Distinction Between Self-Efficacy and Locus of Control

It is important to illustrate the distinction between the constructs of self-efficacy and locus of control to avoid the appearance of a tautology. Though both constructs deal with beliefs about an individual's perceived capabilities, these constructs differ

conceptually. Self-efficacy is assessed at a micro-analytic level while locus of control deals with general self-perceptions (Pajares, 1996). Both constructs are included in the conceptual model for this research in order to investigate both the overall and task specific beliefs the students hold in regard to their perceived capabilities.

Self-efficacy is usually considered to be situation and task specific. As a result, an individual may be very efficacious in one situation, but have low self-efficacy in another. For example, an individual may have a great confidence in the ability to write a resume, but have very little confidence in the ability to interview successfully.

Locus of control is a more global construct and is based upon outcome expectancies on a global scale rather than on task or behavior specific confidence expectancies (Bandura, 1986). The belief that internal or external factors determine outcomes is universal (Rotter, 1975). The control one feels over one's own life crosses over from one situation or task to the next. While a person seeking employment may feel more efficacious about writing a resume than participating in an interview, for both activities, s/he will have similar feelings about control over outcomes of the job search.

Recently Bandura (1997) provided conceptual and empirical differentiation between the two constructs, beliefs about whether one can produce certain actions (perceived self-efficacy) cannot, by any stretch of the imagination, be considered the same as beliefs about whether actions affect outcomes (locus of control)" (p. 20).

Self-Appraisal Process

A considerable amount of reflection on and consideration of career options should occur during the college years. Clarification of vocational purpose is a central

component in the identity development process. Self-appraisal is vital to this process. Aspects of the self appraisal process involve the degree of awareness an individual has of the career decision making process, the amount of thought an individual has given to alternative careers, and the individual's level of self-reliance in making the career decision.

For the purpose of this research, self appraisal involved an individual's level of analysis of career options while considering one's aspirations and needs, expectations, interests, abilities, and knowledge in order to reach a decision certainty in the academic major selection. According to the construct, career exploration and self-assessment are necessary to accomplish academic major decision certainty. Individual who had not engaged in self-appraisal activities were predicted to have lower levels of decision certainty in the academic major choice. Because deciding involves considering all information, weighing alternatives, and pursuing a course of action, the self-appraisal process within career decision making was considered essential in major selection and resulting certainty with selection.

Decision Certainty

As explained earlier, decision certainty is a new concept in the literature pertaining to career and academic decision making. Decision certainty was conceptualized to explain the "quality" of a student's major choice. Conceptually, decision certainty was defined as the current degree of commitment to, and contentment with, a choice (in this case with the academic major selection) after a decision is made. This distinction differed from the current literature that discussed major choice in the

context of students being either undecided or decided. As reflected in the literature, decidedness alone is not necessarily a good outcome if the decision was reached hastily or for reasons in conflict with the student's personal characteristics (Betz, 1988). By focusing on decision certainty, the reliability of the decision could be ascertained. For an individual to arrive at decision certainty, it was assumed that realistic consideration of career options and personal characteristics had occurred. As a result of that consideration, the level of commitment to and contentment with the decision was expected to increase.

Commitment and Contentment

What exactly are meant by contentment and commitment? Contentment with the decision relates to the degree of satisfaction and freedom from doubt, anxiety, and other negative feelings an individual experiences once the decision has been made. Commitment to the decision deals with the level of post decisional stability of the choice illustrated by the degree of dedication an individual exerts in fulfilling that choice once it is made.

Decision certainty along with locus of control, self-efficacy, and self-appraisal were the constructs utilized in this research. The conceptual framework (Figure 1, p.17) organizes input (presage variables), mediating (psychosocial variable), and outcome (decision certainty) variables of the study. The accompanying theoretical discussion (above) provides the rationale for selection of the variables and construction of the model. Within this framework, the problem, purpose, and importance/significance of the research will be addressed in the sections that follow.

Statement of the Problem

Enormous amounts of energy and resources are expended in higher education in identifying and trying to assist and retain those students struggling with selecting an academic major. Focusing on understanding and explaining the decision making process and psychosocial factors related to academic major selection are important. An extensive amount of research exists on choice and decidedness of college students in the retention literature, however, deficits in the current research occur across the following four levels:

1) Theory/ Conceptualization

Previous research findings on undecided students lack a theoretical framework.

2) Operational Definition

Previous research has utilized a dichotomous variable of undecided/decided and does not account for the degree of certainty in the choice among decided students; treating all decided students as a homogeneous group. Researchers have failed to classify undecidedness/ decidedness as a continuous variable rather than a categorical variable.

3) Simplistic Nature

Previous research has been conceptually simplistic and methodologically has tended to look only at a small number of variables at a time. For example, though psychosocial variables have been linked to indecision, the interaction of these psychosocial variables as they relate to the decision making process has not been studied. Furthermore, previous research has typically focused on

presage and demographic variables rather than more theory-rich variables in attempts to explain undecidedness.

4) Research Design

The design of past studies is also of concern. Much of the research has focused on simple subgroups of the student population rather than on the overall student body. Research mainly has targeted undecided students, incoming freshmen, and underclassmen. There are few known studies in the literature focused on major changers, the transition of these students from one major to the other, and how these variables relate to levels of decision certainty and student personal/ psychological variables. This study addresses these concerns.

Purpose of the Study

The purpose of this study was fourfold. First, this study attempted to expand the traditional conceptual framework for understanding academic major decisions by creating a new construct of decision certainty in the academic major selection. Second, incorporated in this study was the development of new instruments to measure academic major decision certainty, student academic self-appraisal, and student academic major self-efficacy motivation. Third, this study utilized social cognitive theory (i.e., self-efficacy and locus of control) to better understand academic major decision certainty as a complex, multi-faceted construct. Finally, because the sample utilized in this study extended to all subsets of the student population, broader practical applications and implications were attained, and the generalizability of the results extend beyond one or a small group of students reflected in many studies to date.

Importance/ Significance of the Study

This study was considered important from several perspectives. First, this study contributed to existing theory regarding the constructs of self-efficacy, locus of control, and self-appraisal by illustrating the role each variable played in academic major selection decision certainty. This study, unlike past investigations, focused on both the cognitive and affective domains of college students' career development by examining the relationships between undergraduates' locus of control, career and academic self-efficacy, and self-appraisal as related to decision certainty. A contribution of the findings is to the higher education retention and student development literature by suggesting possible means for identifying individuals who are at higher risk for difficulty in achieving academic major decision certainty. The findings of this study also add knowledge to the research on major changers which is limited. Since no prior studies of these variables were known to have been conducted, theoretical and practical applications were anticipated. This study contributes to developing a richer conceptual framework that incorporates personal/psychological constructs known to mediate human behavior.

Furthermore, the findings of this study contribute to current practices utilized by career services professionals in the higher education setting. Additionally, instruments developed for the study proved to be constructive in accounting for decision certainty and upon further development, can be used in additional research and assessment. The information gained about the study variables (individually or in concert) as predictors of decision certainty contribute to the literature in this area

Study Variables

Conceptual/Operational Definitions

The dependent variable in this study was decision certainty regarding the selection of an academic major. The independent variables were self-efficacy, the self-appraisal process, and locus of control. Formal definitions of the variables used in this study are provided below. For each variable, a conceptual definition is given followed by an operational definition of the construct. The set of measures administered to the study participants were a compilation of the operational definitions for the constructs. The set of measures is included in Appendix C.

Dependent Variable

Decision Certainty

Conceptual Definition - *Decision Certainty* is a personal/psychological state of affairs encompassing both cognitive and affective elements of personal contentment with choices made and commitment to courses of action to pursue goals emanating from choices made. Decision certainty varies in degree from one individual to the next given choices made (or not yet made), and it serves as an impetus to pursue or not to pursue goals derived from choices made. Decision certainty is an end state that results from active decision making processes.

Operational Definition - *Decision Certainty* of academic major selection was operationally defined in this study by the Academic Major Decision Certainty Scale (AMDCS). As decision certainty is a new construct, the measure was specifically designed for use in this study.

Independent Variables

Self- Efficacy

Conceptual Definition - *Self-Efficacy* is an individual's beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments. Self-efficacy has both cognitive and affective components that comprise the individual's belief system that motivate the individual to execute courses of action in given situations.

Operational Definition(s) - *Self-Efficacy* was operationally defined in this study by two measures: a) the Career Decision Making Self-Efficacy Scale (CDMSES) (Taylor & Betz, 1983) and b) the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) which was specifically designed for this study. The SAMSEMS was adapted for use with college students from a self-efficacy measure originally designed for teachers (Loup & Ellett, 1994; Loup, 1994). Items from the CDMSES are designed to measure students' academic major self-efficacy beliefs while the SAMSEMS is a more direct measure of students' levels of self-efficacy persistence and motivation.

Self Appraisal

Conceptual Definition - *Self-Appraisal* is a dynamic individualized system of internal assessment and evaluation encompassing both cognitive and affective components engaged in by students when they consider options related to particular decision choices (e.g. specific to an academic major or when comparing choices between majors). Self -appraisal involves realistic self awareness and reflection on

academic major options while considering one's aspirations, needs, expectations, interests, abilities, and knowledge.

Operational Definition - *Self- Appraisal Process* was operationally defined by the Student Academic Self -Appraisal Inventory (SASI) specifically designed for use in this study.

Locus of Control

Conceptual Definition - *Locus of Control* is conceptually defined as the degree to which one believes that internal or external determinants control life experiences. It is one's personal perception/belief that the reward of an event or activity is due to or contingent upon one's own attributes or behavior (Internal Locus of Control) versus forces outside one's self or that may occur independently of one's own actions (External Locus of Control).

Operational Definition - *Locus of Control* was operationally defined in this study by the Rotter Internal Versus External Control of Reinforcement Scale (LOCRS) (Rotter, 1966).

Research Hypotheses and Questions

Hypotheses and Rationales

From the previous discussion, the following primary study hypotheses emerged.

Hypothesis 1: Self-Efficacy Beliefs and Decision Certainty

1a: There is a statistically significant, positive relationship between college students' levels of self-efficacy beliefs about their abilities to make academic major decisions and their level of decision certainty in the major choice.

1b: There is a statistically significant, positive relationship between college students' levels of self-efficacy motivation for making academic major decisions and their level of decision certainty in the major choice.

Rationale

The role of self-efficacy in determining human behavior supports this hypothesis. According to Bandura, (1997) efficacy expectations develop and are motivated by four sources of information: enactive mastery experiences, vicarious experiences, verbal persuasion, and psychological and affective states. These four sources of information constitute the building blocks of self-efficacy and are utilized in the career decision making process. The four sources provide the information needed to influence a students motivation to persist in the academic major selection process.

Of interest in this study was the role of self-efficacy in determining students' personal judgement of motivation (effort and persistence) to make an academic major selection. This judgement is based upon perceived personal capabilities to organize and execute courses of action required to accomplish that goal and is derived from the four sources of information that influence motivation.

The motivational elements of the self-efficacy construct involve student perceptions of initial effort and task persistence, persistence in the face of uncertainty and in overcoming obstacles, and the willingness to persist in pursuits in goal attainment in spite of repeated failure. Inability to commit to a career decision has typically been found to be due to a low sense of self-efficacy about one's ability to make good career decisions (Seligman, 1994; Taylor & Betz, 1983). Taylor and Betz

(1983) also found that students who had yet to make a commitment to a career had significantly less confidence in their ability to perform decision making tasks than did their peers who had chosen a career.

The conceptual framework for the study (Figure 1) assumed a non-recursive interaction between self-efficacy and decision certainty consistent with Bandura's (1997) conception of triadic reciprocal causation. Thus, as efficacy levels increase, decision certainty is increased; and as decision certainty increases, self-efficacy is enhanced. It was therefore reasonable to assume that students' who exhibit high levels of decision certainty once an academic major choice has been made will also exhibit high degrees of self-efficacy capability and motivation.

Hypothesis 2: Self-Appraisal and Decision Certainty

There is a statistically significant, positive relationship between the strength of college students' self-appraisal and their degree of decision certainty in the selection of an academic major.

Rationale

Self-appraisal is defined as a dynamic individualized system of internal assessment and evaluation encompassing both cognitive and affective components engaged in by students when they consider options related to particular decision choices (e.g. specific to an academic major or when comparing choices between majors). Self-appraisal involves realistic self-awareness and reflection on academic major options while considering one's aspirations, needs, expectations, interests, abilities, and knowledge.

The construct assumes that individuals undergo increasingly more complex self-appraisal during career exploration in order to accomplish academic major decision certainty. This reasoning is supported by the career and developmental theories discussed earlier and by the research of decision theorists- Janis and Mann (1977), Tiedeman and O'Hara (1963), and Harren (1979) which outline the progress of decision making through stages and emphasize the role of self-appraisal as critical to this process. Therefore, self-appraisal was considered to be an instrumental aspect of an academic major choice with resulting decision certainty.

Hypothesis 3: Locus of Control and Decision Certainty

There is a statistically significant, positive relationship between the degree of college students' internal locus of control and the degree of decision certainty in the academic major choice.

Rationale

Internal locus of control refers to the degree that an individual perceives that the reward or outcome of an event or activity is due to and contingent upon one's own attributes or behavior. An individual with high internal locus of control is considered to take greater responsibility for the decision made and utilizes various rational strategies during the decision making process. As a result, reduction in the negative feelings associated with a particular choice would be lessened due to the intrinsic value associated with the decision. A person with internal locus of control is intrinsically motivated to incorporate strategies known to contribute to dissonance resolution such as considering all viable alternatives, employing freedom of choice, and accepting

responsibility for the decision. Therefore, it was postulated that higher levels of internal locus of control would be related to higher levels of decision certainty.

Research Questions and Rationale

In addition to the primary research hypotheses, a variety of supplemental research questions were also addressed by this study. These included:

* How much of the variation in decision certainty among students is accounted for by the combination of locus of control, self-efficacy, and self-appraisal?
* What is the relationship among the various independent variables in the study?
* What are the psychometric properties (validity and reliability) of the measures used in the study?
* Can a conceptually meaningful and statistically robust structural equation model be developed from the data that is consistent with the conceptual framework used to organize the study (Figure 1)?
* What are the causal comparative relationships for selected subgroups of the study sample?

The rationale for including these questions was to ensure the psychometric quality of the study, to verify the accuracy of the conceptualization of variables, and to assess the roles and relationships among the variables relative to the purpose of the study. For example, despite numerous studies assessing the role of some of these factors in relation to major choice and indecision, no studies exist that have examined these factors collectively as predictors of decision certainty in academic major selection. The third research question regarding psychometric properties was formulated to

determine whether or not the self- appraisal and decision certainty constructs as measured were multidimensional and to examine the reliability of the two measures specifically developed for this study.

In addition to the questions listed above, additional supplemental research questions were addressed in this study as they emerged from the results of the primary data analyses.

Assumptions

The first assumption of the study was that students would participate in the data collection phase of the study and that they would be honest in their responses. Secondly, this study was theoretically based on research and literature garnered on the traditional aged college student, the assumption was made that this information would also apply to non-traditional student as well. A third assumption of the study was that the selected sample of summer session students was representative of the University's student population.

Limitations

The generalizability of the study findings is limited to populations similar to those used in the study. Since this study utilized students from only one university it may limit generalizability of the results to student populations that are comparable to this setting- other land grant, state flagship, or Carnegie Foundation designated Research I Universities. The fact that participation in this study was voluntary is also considered a limitation. However, the specific demographic information obtained minimizes this concern and allows for comparisons to be made.

Chapter Summary

Chapter 1 provided a discussion of the rationale and background for the study followed by the statement of the problem, an examination of the conceptual framework guiding the inquiry, and delineation of the study variables. Primary research questions, as well as supplemental research questions are included. Chapter 2 which follows, reviews the related literature and research pertinent to the major selection process and the variables introduced and defined in Chapter 1.

CHAPTER 2: REVIEW OF RELATED LITERATURE AND RESEARCH

Introduction

This chapter reviews the related literature and research pertinent to the major selection process and the variables introduced and defined in the Introduction. Included in this chapter are a) a review of psychosocial theory, b) career development theory, c) student development theory, d) a review of the literature on career/major indecision, e) a review of the literature on decision making in general and specifically to career and major choice emphasizing the role of self-appraisal within this process, and f) a discussion of social learning theory and the role of self efficacy and locus of control in career decision making. The review of the literature will begin with developmental theories and models that seek to identify the process of development and growth during late adolescence and early adulthood. Specifically, this review will focus on traditional college student development theory and vocational theory of career development during the same period. Within this context, the importance of establishing a vocational identity and selection of a major will be discussed and related to the college retention literature and theories of decision making. Theory will also be reviewed to illustrate the importance of self-efficacy, locus of control, and self-appraisal in the decision making process that leads to selection of a major and decision certainty.

The career development literature indicates that a relationship exists between career goal identification and persistence in school (Astin, 1975, Beal & Noel, 1980; Peterson, 1993). This literature also suggests a relationship between declaration of a major and academic success (Foote, 1980). The choice of a major is the first step in

choosing a career, occupation, or job for the college student. The choice of a vocation demands the consideration of one's abilities, interests, background, educational experiences, and opportunities. Spokane and Hawks' (1990) review of the literature identified making career choices and finding direction as the most common career-related problems of young adults. Therefore, research on factors related to effective career decision-making, specifically regarding the selection of a college major, is crucial in order to ensure commitment and contentment with career choice.

Vocational choice has a profound impact on an individual's life. Career selection encompasses consideration of earning potential, choice of lifestyle, interpersonal relationships, and public expression of individual identity (Raskin, 1987). The identity component is extremely important due to the centrality of work in the life of the individual, as a major sources of self, career satisfaction, and success (Crites, 1976). Choice of a major by a traditional college-aged student is an enormous undertaking that requires a premature commitment for the future made today and a commitment to a vocation for perhaps the rest of the individual's life. The freedom to postpone a decision does not exist if the student is to progress through to graduation.

Twenty years ago, Astin (1977) suggested that for many students career choice in college is more the implementation rather than the selection of a career. Pascerella and Terenzini (1991), in a review of the relevant literature, found "substantial evidence to support the claim that initial career choice at the beginning of college tends to be the best single predictor of career choice at the end of college and the career occupation actually entered." (p.424).

Career indecision has been receiving increasing attention in the career literature. Counselors helping people with career indecision should identify the nature of their clients' indecision; view the indecision in the context of the client's stage of development, sense of self, and level of work importance; and use that information to plan interventions that are most likely to be helpful" (Seligman, 1994, p.35). This approach is especially recommended when working with young adults during their decision making process due to the prevalence of indecision among individuals in this age group. In order to understand the importance of assisting students who are undergoing the career decision making process as related to academic major selection, it is important to put this task into developmental perspective.

Overview of Development Theory

"The concept of career development as a lifelong process with identifiable stages seems to have achieved almost universal support and acceptance. Researchers also seem accepting of the importance of self-concept in the process of career choice" (Seligman, 1994, p.13). Forming a career identity is a central component of all theories describing overall personal development and career development. Therefore, the literature review will begin with a review of personal and career development theory with emphasis on the traditional aged college student's development within the psychosocial framework.

Pyschosocial Theory

Psychosocial theory is based on the work of Erik Erikson (1959, 1963, 1968). Theories in this domain view individual development as a process that requires the

accomplishment of a series of developmental tasks. These tasks arise partly as a result of the aging process and partly as the result of sociocultural and environmental factors. Three elements of Erikson's work have exerted considerable influence on most psychosocial theories of career and college student development (Pascerella & Terenzini, 1991). Specifically, the "epigenetic principle," the conception of developmental tasks or crisis of identity verses identity confusion, is the dominant developmental task for the traditional aged college student and is central to most psychosocial theories on student development.

The "epigenetic principle" states that "anything that grows has a ground plan, and out of this ground plan the parts arise, each part having its time of special ascendancy, until all parts have arisen to form a functioning whole" (Erikson, 1968, p. 92). "The principle implies not only the notion of sequential, age-related, biological, and psychological development, but also the view that the particular character and extent of development are shaped in important ways by the individual's personal environment" (Pascerella & Terenzini, 1991, p. 19).

The conception of developmental tasks or "crisis" is the second influential element of psychosocial theory. Erikson postulated eight stages or periods of development. Within each stage, a "crisis" or a time for decision requiring a choice after serious consideration of alternative courses of action is required. The individual's choice at each crisis stage determines whether progression, regression, or stasis occurs in psychosocial development. Therefore, successful resolution of the crisis at each stage is required before an individual can progress to the next stage.

The third important contribution of Erikson to psychosocial theory relating to college students is the "identity versus role confusion" stage (V) of his theory. This stage occurs during the teen years when the individual is caught between childhood and adulthood and struggles with an uncertainty about who s/he is and where s/he is going. Resolution of this crisis one of the dominant developmental tasks for the traditional college age student. Stage V occurs during adolescence and early adulthood and involves establishing relationships, vocational direction, and resolving ideological issues. During this stage, the individual needs to integrate various roles (son or daughter, sibling, friend, peer, etc.) into one identity.

Identity resolution centers on answering the questions, "Who am I?" and "What will I be?" (Knefelkamp et al., 1978). Developing an autonomous, independent and integrated identity is the result of finding answers to these questions and achieving resolution. Inability to do this may lead to role confusion- trying to be all things to all people- or trying out one role after another and failing to develop a sense of purpose. Identity development and development of purpose, occupy central places in most psychosocial theories of change among college students. In the career development literature, answering the question "Who will I be?" receives even greater emphasis.

Theories of Career Development

The developmental approach to career counseling was accepted into the vocational literature through the work of career theorists such as Donald Super (1957, 1963) and Ginzberg, Ginsburg, Axelrod, and Herma (1951). Both Ginzberg and his colleagues and Super were influenced by the work of Buehler (1933). Buehler viewed

development as consisting of five life stages: growth, exploration, establishment, maintenance, and decline. This view of life stages was translated to the realm of career development.

Most contemporary career theorists accept the developmental nature of the process of making career plans. This developmental process is viewed as ongoing and continuous across the life span (Seligman, 1994). A considerable amount of reflection on and consideration of career options is occurring during the college years. In fact, the degree of certainty with which one selects a major is a central component of the student career development literature just as clarification of vocational purpose is a central component in the identity development process. Career development is viewed as life planning and fosters overall development according to Seligman (1994):

> The process of finding and integration of occupational, interpersonal, and recreational aspects of life that satisfy one's needs and are consistent with one's values. This is a synergistic process in which success and maturation in one area is likely to enhance and contribute to development in another area. Although this is a lifelong process, young adults probably do more choosing and planning of their lives than does any other age group" (p.303)

The following is a review of the literature on the application of the developmental approach to vocational counseling with an emphasis on vocational development of young adults.

Ginzberg's Stages of Career Development

Ginzberg et al. (1951) characterized career development into three broad stages: fantasy, tentative, and realistic. The realistic stage completes the career development. This third stage, begins at age 18 and continues through age 24, consists of exploration, followed by

crystallization or commitment to a career goal, and is complete with specification or specialization to the vocation. According to this theory, the bulk of career decision making occurs during the traditional age of college attendance.

Super's Five Stages of Career Development

Donald Super also formulated a stage approach to career development. Super and his colleagues (1957) postulated a five-stage model of career development. Stage One is the growth stage that extends from birth to age 14. The fantasy, tentative, and realistic stages of Ginzberg's stages are included. Super's second stage, exploration, extends from age 15 to age 24 with reality playing an increasing role in career development. Within this stage, exploration activities can be described as tentative (ages 15-17), transitional (ages 18-21) and trial (ages 22-24). Stage three of Super's model is the establishment stage, involving early trial in a career and shifting (ages 25-30) followed by stabilization (31-44). Stage four of Super's model, the maintenance stage, occurs during the middle years, and in the original model was followed by years of decline (65 and on), including deceleration (65-70) and retirement (age 71 and on).

In later research, Super (1963) elaborated on the career development of young adults. Super divided the young adult years into the specification (ages 18-21), and implementation (21-25) stages and described tasks and experiences that generally accompany successful passage through these phases. Seligman (1994) summarized the tasks and experiences based on Super's theory as follows:

The specification stage includes (1) a vocational preference and awareness of the need to specify, (2) use of resources in specification, (3) awareness of factors to

consider, (4) awareness of contingencies that may affect goals, (5) differentiation of interests and values, (6) awareness of present-future relationships, (8) consistency of preferences, (9) possession of information concerning the preferred occupation, (10) planning for the preferred occupation, (11) wisdom of vocational preference, (12) confidence in a specific preference.

Similarly, the implementation stage includes tasks and experiences such as (1) awareness of the need to implement preference, (2) planning to implement the preference, (3) executing plans to qualify for entry, (4) obtaining an entry-level job.

Theories of College Student Development

Young adults in college environments will encounter many experiences and choices that differ from young adults in other settlings. These environmental differences will lead to some personal and developmental differences. For this reason, theories of college student development are prevalent in the higher education literature. These theories combine personal and vocational development as related to the traditional college aged student. Pascerella and Terenzini (1991) describe four clusters of developmental theories and/or models of college student change. The four clusters are (1) topological models, (2) person-environment interaction models, (3) cognitive-structural theories, and (4) psychosocial theories. Though included in the higher education literature, topological and person-environment interaction theories are not technically developmental theories as they do not describe the hallmarks of development or ways to measure or foster development (Chickering & Reisser, 1993). Consequently, these two clusters will receive limited attention.

Topological Theories

Topological theories, which have no unifying theoretical heritage, describe distinctive but stable differences in learning style, personality type, socioeconomic background, or temperament as context for development. The Meyers-Briggs typologies (Meyers, 1980) and the Keirsey and Bates (1978) temperaments are the major theories of this type used in the higher education literature.

Person-Environment Interaction Theories

Person-environment interaction theories focus on how the environment influences behavior through its interaction with characteristic of the individual. Holland's (1966) theory of vocational personalities and work environments is most prevalent in the higher education literature. Holland's (1966) theory proposed a person-environment fit theory of occupational choice in which individuals search for environments that match their expectations, skills, abilities, values, and attitudes.

Cognitive-Structural Theories

Cognitive-structural theories are those that describe changes in thinking and the evolving frames of references through which people perceive, organize, and reason about their experiences. Piaget (1948, 1952) defined the basic concepts and assumptions of this school of thought. Kohlberg (1969) refined and extended Piaget's work with his theory of moral development. Perry's (1970) scheme of intellectual and ethical development along with Kohlberg's (1969) theory have been used extensively in college teaching and student affairs research. Recent theories of Gilligan (1982), Kegan (1982), and Kitchener and King (1981) have broadened understanding of this kind of

development. The various studies of Hackett, Lent and Betz apply the self-efficacy construct to career decision making has the potential to contribute in this area and will be reviewed later in this chapter.

Psychosocial Theories

Psychosocial theories, as mentioned earlier, view development as a series of tasks, including qualitative changes in thinking, behaving, valuing, and relating to others and self. These tasks occur across the life span and include the individual's pattern of responses to issues and adaptations. Major models and theorists in this cluster of student development theory include Chickering's (1969) seven vectors of development, and Marcia's (1966) model of ego identity status.

Across these clusters, three theorists have received greater attention: Lawrence Kohlberg, William Perry, and Aurthur Chickering. The work of these three individuals has had a major influence on the study of college student impact. (Pascerella & Terenzini,1991). Of the three theorists, the work of Chickering deserves additional emphasis. Within psychosocial theory, no other theorist has had greater influence on the study of college student development than Arthur Chickering (Pascerrelli & Terenzin, 1991; Ellison & Simon, 1973; Delworth, U., Hanson, G. R. & Associates, 1989).

Chickering's Seven Vectors of Student Development

Chickering's theory stems from Erik Erikson's original theory and provides the specifics that Erikson's theory lacks in describing college student development. In his model, Arthur Chickering focuses completely on Erikson's Stage V: Identity versus

Role Confusion. It is during the identity stage that the traditional college age student interacts with the demands of the college environment to complete identity development across seven vectors. Chickering (1969) defines each vector as a series of developmental tasks, a source of concern, and set of outcomes. "Development along each vector involves cycles of differentiation and integration . . . the student continually apprehends more complexity . . . these more differentiated perceptions and behaviors are subsequently integrated and organized so a coherent picture of himself is established" (Widick, Parker, & Knefelkamp, 1978, p.21). The process involves a combination of simple maturation unfolding within the stimuli provided by the environment.

Chickering's Seven Vectors of Student Development include the following: Vector 1: Achieving Competence; Vector 2: Managing Emotions; Vector 3: Developing Autonomy; Vector 4: Establishing Identity; Vector 5: Freeing Interpersonal Relationships; Vector 6: Developing Purpose; and Vector 7: Developing Integrity. Chickering identified these seven vectors due to the absence of any systematic framework to describe the specific development of college students. Accomplishment of the developmental tasks at each vector is vital in the process of identity development.

The current research is concerned with exploring Vector 6: Developing Purpose. Development along this vector occurs as the individual assesses and clarifies the interests both educationally and vocationally. This vector is based not just on a current understanding of "Who am I?" but also on the future orientation of "Where am I going?" (Chickering, 1969). Growth requires the development of plans that integrate

recreational and vocational priorities, vocational options and aspirations, and life style preferences. The process of selecting a major is a crucial aspect for college students undergoing the Vector 6 task of developing purpose. For this reason, many studies attempt to show how students who are undecided in the academic major selection process differ from those students who select a major.

Indecision

Crites (1969) has defined indecision as "the inability of the individual to select, or commit himself to a particular course of action which will eventuate in his preparation for and entering a specific occupation" (p. 305). Three possible reasons for indecision are provided: (1) inability to designate one goal from among many, (2) inability to make a choice among many available and viable alternatives, and (3) uncertainty about a choice due to a lack of an appropriate interest pattern. Crites (1969) views indecisiveness as the problematic avoidance of a choice due to general personal problems which is associated with pain in the decision making process rather than doubt related to a specific career choice. Studies have been conducted to try to better understand indecision.

Initially, these studies focused primarily on the difference between decided and undecided students as a dichotomous variable (Osipow, 1983; Sepich, 1987). The dichotomous classification of decidedness in relation to college major selection has been prominent in the literature since Parson (1909/1967) advised counselors to classify clients in two main categories decided and undecided. A historical review of career indecision literature performed by Slaney (1988) found that this classification was

utilized exclusively from the 1930's through the late 1970's and as a result characterized most of the body of research as simplistic. The mid-1970's, according to Slaney (1988) brought a change in how researchers operationally defined indecision. Rather than a dichotomous state, indecision was viewed as an uni-dimensional continuum ranging from undecided to decided. The problem with these conceptions was that students were viewed as a homogeneous group. Currently, researchers view indecision as multidimensional and undecided students as including heterogeneous subgroups

With increased research in this area, the multidimensional quality of career indecision began to be viewed as more probable. Subsequently, in the past decade increased attention has been to the differences between clients who are indecisive. "Indecision has varied levels and forms demanding differing and often individualized approaches" (Danis , 1989, p. 412). Individuals who are experiencing career indecision, or uncertainty about what career options to pursue, have been categorized into three groups by Savickas (1989) as a result of extensive review of the literature on this construct.

The first group includes those individuals who feel no pressure to make decisions. Despite good decision-making skills and confidence that an appropriate choice would eventually be made, these individuals defer making a choice due to lack of information about their options. This group is viewed as making the developmentally appropriate choice to postpone commitment until they have gathered more information. Van Matre and Cooper (1984) and Brown (1987) identified this type of uncommitted individual in their research as well.

The second group of individuals experiencing career indecision includes those who manifest a moderate degree of immaturity and anxiety about career decision making; experiencing moderate to severe indecision (Seligman, 1994).

The third group of indecisive individuals is comprised of students who exhibit considerable immaturity in career development and are highly anxious about their inability to make a decision. Van Matre and Cooper (1984) call these individuals undecided-indecisives because they are unable to make decisions, despite having the necessary information to do so. This inability to commit to a career decision is typically due to a low sense of self-efficacy about the ability to make good career decisions (Seligman, 1994; Taylor & Betz, 1983). Taylor and Betz (1983) theorized that individuals fail to engage and persevere in career decision making activities because of low self-efficacy in relation to the process itself rather than because the decision making process produces anxiety (Kaplan & Brown, 1987). Taylor and Betz (1983) also found that students who had yet to make a commitment to a career had significantly less confidence in their ability to perform decision making tasks than did their peers who had chosen a career.

Even students who initially select a major, may be at risk for low decision certainty. It is estimated that between 50% and 70% of all college students change their major before they graduate (Foote, 1980; Slaney, 1980; Titley, Titley, & Wolff, 1976). Many people who describe themselves as decided about their career choice still experience discomfort about their choice and have made a choice under pressure, to fulfill the desire to please others such as parents, or made the decision without enough

information about themselves or the world of work (Newman, Fuqua, Minger; 1990). Often, choices are tentative and subject to change. At most institutions, if students are targeted for assistance with major selection, it is often based upon their undecided status. This often leaves those students who change their major without the benefit of targeted academic or career counseling (Steele, Kennedy, & Gordon, 1993). The research literature well documents that large numbers of students are in a state of transition or indecision.

There are many reasons why students change their major: rejection from selective admissions programs, failure to meet entrance requirements, flooded markets in selected area, and disinterest in and misinformation regarding original selection (Elliot, 1984; Pascarella & Terenzini, 1991). For upper-level students, anxiety and confusion occur during this transition. These students have accrued credit hours which may not apply to new majors and often have not considered alternative majors. Gordon and Polson (1985), through a national survey, found that this phenomenon was common especially among large institutions which serve large number of students.

For most students, the academic major selection process often involves stress or anxiety within the individual as conflict between alternative choices occurs. As a result of the negative emotional states - doubts, worry, anxiety, outside influences, internal desires- associated with the need to make a decision, individuals will seek to reduce or eliminate the states. Methods used to accomplish this goal include procrastination, rationalization, denying responsibility for making the choice, and rushing to make a choice just to have it accomplished. According to Janis and Mann (1977), man is

vulnerable to making gross errors in arriving at a decision through the use of biased information processing and superficial search. What processes constitute high quality decision making? This question is addressed next.

Decision Making

From an extensive review of the literature on decision making, Janis and Mann (1977) derived seven major criteria that can be used to determine whether decision-making procedures are of high quality.

> The decision maker with the best of his ability and within his information-processing capabilities: 1) Thoroughly canvasses a wide range of alternative courses of action; 2) Surveys the full range of objectives to be fulfilled and the values implicated by the choice; 3) Carefully weighs whatever he knows about the costs and risks of negative consequences, as well as positive consequences, that could flow from each alternative; 4) Intensively searches for the information relevant to further evaluation of the alternative; 5) Correctly assimilates and takes account of any new information of expert judgement even when the information or judgement does not support the course of action he initially prefers; 6) Re-examines the positive and negative consequences of all known alternatives, including those originally regarded as unacceptable, before making a final choice; 7) Makes detailed provisions for implementing or executing the chosen course of action, with special attention to contingency plans that might be required if various know risks were to materialize. (p.11)

The research findings outlined above prompted Janis and Mann, (1977) to create a more comprehensive decision-making model. A major concern regarding previous analyzes of personal decision making distinguished between two major phases in the decision-making process- the period preceding the announcement of a decision and the period that follows it. This distinction is too simplistic to fully represent the adoption of a new course of action. So, Janis and Mann described five stages in the decision making process that result in the selection of a stable decision.

Janis and Mann's Stages of Decision Making

The following discussion of the stage model is based largely on Janis and Mann's (1977) description of the model. The five stages and the major concerns associated with each are:

Stage 1. Appraising the Challenge

The major question of this stage is: Are the risks serious if I don't change? Until a person is challenged by some disturbing information or an event that calls attention to an anticipated real loss, s/he will be satisfied with the status quo and maintain an attitude of complacency about whatever course of action (or in action) s/he has been pursuing. The challenging information or event marks the beginning of the decision making process. For example, for an undecided student at LSU who has earned 45 credit hours, discovering that one must declare a major and enter a senior college by the time they have earned 60 credit hours is considered disturbing information. Information (or an event) such as this points out the unfavorable consequences of the current course of action. In the above student's case, the consequence is academic limbo; the student can not remain in the freshman college and can not enter a senior college. Something must be done.

Stage 2. Surveying Alternatives

A call to action of some sorts characterizes the beginning of this stage and weighing whether or not various alternatives are acceptable means of dealing with the challenge? A person must also assess whether s/he has sufficiently surveyed the available alternatives? S/he begins to focus attention on one or more options and to

search for additional alternative courses of actions. A lot of advice seeking and information gathering from a variety of sources occur in this stage. As the alternatives are reviewed, various options are eliminated as unsatisfactory. Eventually, by the end of stage 2, the decision-maker has narrowed down the alternatives to viable options or choices that provide the greatest benefits and possess the least amount of negative consequences.

Stage 3: Weighing Options

The individual now precedes through additional search and evaluation of the remaining options weighing the pros and cons of each alternative in an effort to select the best course of action. Each of these alternatives is mentally tried on for size and is further investigated for information that confirms the existing data regarding positive and negative consequences. The questions which must be answered in this stage are which alternative is best and could the best alternative meet the essential requirements? Indecision and vacillation between choices are common in this stage. Commitment is still not considered.

Stage 4: Deliberating about Commitment

The major question asked in this stage is: Shall I implement the best alternative and allow others to know? The individual decides to adopt a new plan of action, begins deliberating about implementing it, and conveying his/her intentions to others. A major aspect of this stage is the realization that sharing the plan with others will make it more difficult to reverse or change course. Often reconsideration of options and commitment occurs before the individual can precede to stage five.

Stage 5: Adhering Despite Negative Feedback

Initially this stage is idyllic. The individual is determined to have made a decision and is happy with the choice. However as negative feedback regarding the decision is encountered, the individual begins to have doubts. S/he continues to evaluate the questions such as: Are the risks serious if I don't change? Are the risks serious if I do change? The ability to overcome negative feedback is instrumental in maintaining the selected course of action.

Decision-making is not new to the counseling profession, however, it is relatively new in application to college major and career choice. Early research on educational and occupational choice indicated that individuals have unique styles of collecting and processing data. This research indicates that exploring individual styles of decision making might be the best predictors of choice (Dole, 1969; Kaldor & Zytowski, 1969).

Before initiating a discussion on career decision making, it is important to explain the distinction between career decision-making models and career development models. Career development models are broader in scope and, as a result, pay less attention to the underlying psychological processes an individual uses to successfully maneuver the decision making task. Rather developmental models focus on the characteristics of the decision maker and the developmental tasks confronting the individual at each stage of development (Harren, 1979). It is therefore, important to consider career decision making within the context of career development in order to fully understand the decision-making tasks and process. "An individual's progress with

the developmental tasks associated with a particular developmental stage has implications for the degree of progress realized with decision making tasks associated with career development" (Harren, Daniels, & Buck, 1981, p.8).

Tiedeman and O'Hara's Stages of Career Decision Making

Tiedeman and O'Hara (1963) developed a stage-based model of career decision making. This model "portrays how decisions evolve from exploration to commitment, and hence, what readiness might entail regarding a particular decision" (Phillips & Blustein, 1994, p. 66). In this model, the career decision making process occurs within the context of an individual's psychosocial development. "Many individuals do not make a deliberate occupational choice but in a haphazard, trial -and-error fashion leave their jobs whenever something better seems to come alone (Janis & Mann, 1977, p. 35).

Tiedeman and O'Hara (1963) postulated a seven-stage process through which one progresses in making and carrying out decisions. This model emphasizes an occupational decision making paradigm within the developmental perspective of career choice postulated by Super, but adds emphasis to the characteristics of individual decisions. "The first four stages (exploration, crystallization, choice, and clarification) are anticipatory stages, and the last three (induction, reformation, and integration) are implementation stages" (Harren et al, 1978, p.392). The model is not limited to the formulation of a choice, but also covers the process through to implementation of the choice. The period of anticipation encompasses *exploration*, which involves random and acquisitive activity; *crystallization* or the emerging of patterns in the form of alternatives and related consequences leading to clarification and judgment; continues

into organization in preparation for implementation or *choice*; and results in *specification* or solution of the decision making task. The period of implementation involves the adjustment to the choice. This period begins with *induction* during which the individual is largely responsive; *reformation* in which the individual is largely assertive; and *integration* as the process cumulates with satisfaction.

Tiedeman and O'Hara's model serves as the basis for Harren's (1979) model of career decision making which is specific to traditional aged college students. It is also theoretically based on the decision making theory of Janis and Mann within the student development theory of Chickering. Harren limits his model to the typically aged undergraduate student by identifying three student development tasks adapted from Chickering (1969): autonomy, interpersonal maturity, and sense of purpose. The self-concept aspect of the theory is derived from the work of Super.

The Harren Model of Career Decision Making

The Harren Model of Career Decision Making is comprehensive in that it takes into account many of the important parameters involved in career decision making and career development (Harren, Daniels, & Buck; 1981). The parameters included in this model that are relevant to the current research are the stages of the decision making process that the decision maker must pass through, the developmental tasks appropriate to the developmental stage, and the environment or social and interpersonal conditions that exist. The core of the model is a four-stage sequential, decision-making process through which a person progresses in making and carrying out decisions. The four parameters of the Harren Model are explained as follows:

Stage 1. Awareness

In this stage the individual undergoes a self-in-situation appraisal. Accomplishments of the past, present activities, and future plans are evaluated. If dissatisfaction or anxiety result from this appraisal, then the individual moves into the planning stage.

Stage 2: Planning

This stage involves the individual expending time and energy searching for information. The process of exploration results in increased knowledge regarding alternatives, while the process of crystallization begins to narrow the number of alternatives deemed viable as values clarify and priorities increase. This process continues until a specific alternative is selected and the transition to the commitment stage occurs.

Stage 3: Commitment

This stage is an integrative process in which the individual begins to incorporate the commitment within their existing self-concept beliefs. The individual initially begins with a personal and private commitment followed by the selective sharing of the information with others. Depending upon the feedback (positive or negative) received from the select others, the decision either becomes firmer and more widely disseminated or is weakened and possibly retracted. At this point, the individual will either regress to an earlier stage or progress within the commitment stage as the person achieves closure by selecting an alternative, integrating the commitment into the self-concept system, and evolved into the implementation stage.

Stage 4. Implementation

During this stage, the individual becomes oriented to the selected alternative and the environmental factors related to the decision. The sub-phases of this stage are conformity, autonomy, and interdependence. The success and satisfaction outcomes during this stage predict progress through the sub phases until equilibrium in interdependence is reached.

At this stage, the student may visit the academic department in order to obtain additional orientation and information about the major, departmental requirements, related clubs and activities. The student may initially decide to try some courses and then based upon the outcome formally declare the new major.

The above model and examples describes the process of selection of the academic major. For many students, however, movement through the stages is difficult and cognitive dissonance occurs. Therefore, it is important to included the relevant literature on cognitive dissonance and conflict as it relates to individuals (students in this case) and the discomfort they experience during the decision making process.

Cognitive Dissonance

We all tend to be reluctant decision-makers; especially when the choice is important as is the case with choosing a major and vocation (Forsyth, 1987). All the positives of the rejected alternatives combine with all the negative related to the chosen alternatives creating a large amount of discomfort.

Cognitive dissonance theory explains this phenomenon. Developed by Festinger (1957), cognitive dissonance theory holds that the volume of information and the vast

amount of factors to be considered in decision making are so great that a choice is made prematurely in order to reduce the pressure and discomfort associated with sorting through the information as required to choose. As a result, the implications of the choice are not fully considered. The person then continues to reduce discomfort by rationalizing the choice in two ways: The choice is either reinforced through selective attention to information that supports the choice to self and others and/or behavior. explanations and excuses are utilized to maintain a positive self image or by rejecting new information that contradicts the ideas they already hold.

This theory states that once an individual publicly commits to a belief or a decision, a strong need occurs to maintain that commitment. Despite any evidence that the decision is no longer viable. The reduction of dissonance between an individual's personal beliefs and the environments is a major motivation of career decision making (Hilton, 1962). Festinger (1957) purported that people experience tension or discomfort when a deeply held value or belief is challenged by a psychologically inconsistent belief or behavior. Individuals are driven by the need for consistency in thought and perception. Within decision theory, the concept of cognitive dissonance contributes to a decision being made prematurely. Examples of the kinds of conflict that occur as a result of cognitive dissonance within the decision making process are found below:

(1) Approach- Approach Conflict Theory

The individual is forced the make a choice between two equally attractive, but mutually exclusive goals; thus creating a situation where choosing one means giving up the other.

(2) Approach Avoidance Conflict Theory

The individual is "caught" being simultaneously attracted to and repelled by the same goal or activity. Attraction keeps the person in the situation, but distress is caused by negative aspects related to the decision. As a result, ambivalent feelings occur and people tend to vacillate between choices. Ambivalence is a central component of this theory and is usually translated into partial approach (Miller, 1944). Partial approach involves the person continuing to participate in or pursue the positive aspects of the situation and avoid those that are negative. Many of life's major decisions, such as career choice, involve an approach-avoidance dimension.

(3) Double Approach Avoidance Theory

Choices are seldom completely positive or negative. Therefore, people tend to waiver between choices. Just as a choice is about be made the negative aspects loom large and the decision-maker swings back toward the other choice. When double approach avoidance conflict is experienced in major life decisions, such as choice of career, the conflict adds significantly to the amount of stress experienced.

(4) Avoidance-Avoidance Theory

The individual is forced to make an inescapable choice between two equally unattractive goals or outcomes. For example, a college student may hate the thought of studying and taking courses, but doesn't want to quit school either.

Consideration of cognitive dissonance and conflict theory within the decision making process is necessary to insure that premature choice and low quality decision making is avoided. For this reason the role of self-appraisal has been stressed in many

of the decision making models presented. According to these models, analysis of the self is the principal task to consider when initiating a decision. Since the individual will have to come terms with the decision, consideration of personal aspects will contribute to reducing discomfort. A considerable amount of self-reflection on, and consideration of, career options for personal fit usually occurs during the college years in order to reduce conflict in the process of academic major selection. Inasmuch as clarification of vocational purpose is of paramount importance during college experience, self-appraisal is vital to this process

Self-Appraisal

Aspects of the self appraisal process involve the degree of awareness an individual has of the career decision making process, the amount of thought an individual has given to alternative careers, and the individual's level of self-reliance in making the career decision. Self-appraisal involves an individual's movement through levels of increasingly more thorough analysis of career options while considering one's aspirations and needs, expectations, interests, abilities, and knowledge in order to reach a major choice through realistic self awareness. Movement through these levels of self-appraisal and career exploration is necessary in order to accomplish the task of academic major selection.

Students who have not concluded the self-appraisal process will be less likely to have selected a major. Additionally, if a major is selected by an individual who has not conducted a self-appraisal, the certainty behind the choice will be tenuous. Because deciding involves considering all information, weighing alternatives, and pursuing a

course of action, the self-appraisal process within career decision making is essential in major selection and resulting certainty with selection.

Decision Certainty

The review of the decision making literature and the nature of indecision research in the higher education context establish the need for conducting research aimed at understanding the quality of academic major selection methods. The need to move beyond studying college students based only on their decided or undecided status has been established and was discussed in Chapter 1. In order to impact broader issues such as student matriculation and development, a priority for future research is to focus on the process of the academic major selection that results in high levels of decision certainty about the selection.

Decision certainty is a new concept created to explain the "quality" of a student's major choice. Conceptually, decision certainty is defined as the current degree of commitment to and contentment with a choice after a decision is made. This distinction differs from previous literature that discusses major choice in the context of the student being designated as either undecided or decided. Decidedness alone is not necessarily a good outcome if the decision was reached hastily or for reasons in conflict with the student's personal characteristics (Betz, 1988). By focusing on decision certainty, the integrity of the decision can be ascertained. For an individual to arrive at decision certainty, it is assumed that realistic consideration of career options and personal characteristics and self-appraisal have all occurred. As a result, the level of commitment to and contentment with the decision would be expected to increase.

What exactly are meant by contentment and commitment? Contentment to the decision relates to the degree of satisfaction and freedom from doubt and other negative feelings an individual experiences once the decision is made. Commitment to the decision reflects the level of post decisional stability of the choice illustrated by the degree of dedication an individual exerts in fulfilling that choice, once it is made. The concept of commitment is central to most psychological formulations of the decision making process (Janis & Mann, 1977). The dynamics of commitment extend beyond the act of making a decision to post-decisional stability. The component of contentment with the decision is also central to reducing negative consequences, conflict, and discomfort associated with poor quality decision making. What role does cognition play in achieving decision certainty?

Social Learning Theory

The fields of counseling and career development have recently shifted toward the study of cognitive variables and processes (Lent & Hackett, 1994; Mahoney & Patterson, 1992). Applying cognitive methods to understanding career behavior has emerged in the literature only in the past twenty years. Though approaches to career and academic behavior derived from Social Learning Theory represent a relatively recent contribution to the literature, this application reaffirms the belief in personal agency that has deep roots in the study of career behavior and the practice of career counseling (Borgen, 1991). The field of vocation counseling has long held that people are not simply reactors to outside stimuli; rather individuals construct their own career outcomes. External influences are selected, organized, and transformed by individuals

so as to create meaning in the individual's life. By the same token, counselors, theorists, and researchers are also well aware that career development is not just a cognitive-volitional enterprise, that there are often potent (external and internal) barriers to choice, change, and growth. (Lent et al., 1986).

"Social learning theory emphasizes the prominent roles played by vicarious, symbolic, and self-regulatory processes in psychological functioning." (Bandura, 1977, p.vii). Social learning theory postulates that behavior, personal, and environmental factors interact and operate as interlocking determinants of each other. "In the social learning view, people are neither driven by inner forces nor buffeted by environmental stimuli. Rather psychological functioning is explained in terms of a continuous interaction of personal and environmental determinants." (Bandura, 1977, p.11).

Lewin's (1947) forced-field theory provides the initial theoretical framework for these interactions. According to Lewin, B = f (P, E), where individual behavior (B) is a function of personal variables (P) and environmental variables (E). This model was later expanded by postulating an interaction between personal and environmental variables where B=f (PXE) (Bowers, 1973; Endler and Magnusson, 1975).

Reciprocal Determinism

Within Social Learning Theory, Bandura's (1997) construct of triadic reciprocal causation builds upon the forced-field model. According to Bandura, an individual's behavior is not simply a result of environmental influences or of an individual's interpretation of environmental experiences. Rather, an individual's behavior is a product of the tri-directional interaction of personal factors (cognitive, affective, and

biological events) behavior, and environment. In this scheme, a) personal attributes such as internal cognitive states and physical attributes, b) external environmental factors, and c) overt behaviors all operate as interlocking mechanisms that affect one another tri-directionally.

In contrast to some of the other theories described herein, social learning theory stresses the situation and domain specific nature of behavior, relatively dynamic aspects of the self-system, and the means by which individuals exercise personal agency (Lent, Brown, & Hackett, 1994). According to Bandura (1977, 1997), people are capable of controlling their own behavior by arranging environmental inducements, creating cognitive supports, and producing consequences for their actions.

Social Learning Theory Applications to Education and Vocation

The recent application of social learning theory to the study of educational and vocational behavior has been one of the most heuristic and useful practices in career development research. (Betz & Voyten, 1997). Two branches of inquiry recognizing the relevance of the social learning perspective for career development have evolved. One branch is derived from Krumboltz and colleagues' (1976; Mitchell & Krumboltz, 1990) social learning theory of career decision making which is based on Bandura's general theoretical framework. The other line of inquiry is based upon Hackett and Betz's (1981) application of the self-efficacy construct to career behavior.

Krumboltz's theory states that "effective career decision making may depend largely on opportunity and the skill that an individual has in matching her or his internal self-reinforcing patterns to those of the environment" (Unruh, 1979). According to

Unruh (1979), this interaction between internal and external stimuli is critical to successfully making a career choice. The individual who relies wholly on environmental influences or external rewards may become so compliant that s/he makes no choice at all resulting in stagnation or complete programming by outside factors. Conversely, complete reliance on internal resources without consideration for external events can also result in an inability to make a career choice due to ineffective operation within certain contexts and in relation to external pressures. The inclusion of the locus of control variable was based upon its application to vocational theory by Krumboltz and his colleagues.

The application of self-efficacy to career development was introduced into the career literature by Hackett and Betz, (1981). The researchers determined that self-efficacy might be an important variable to include in models of career development since research has shown the construct to influence achievement behavior, academic and career decisions, and career adjustment. Though research has strongly suggested the role of self-efficacy in the context of career choices, Betz and Hackett (1986) noted that the role of self-efficacy in influencing the process of career decision making had received little research attention. The importance of the self-efficacy construct in the application to vocational behavior is that it incorporates the "phenomonological basis of Super's ideas about the self-concept" (Betz, 1994 p. 36) and is also embedded within social learning theory so it is directly applicable to counseling interventions. For all of the reasons outlined above, self-efficacy was included as an important variable in this study.

Social learning theory applications, specifically the concepts of self-efficacy and locus of control, are of major concern in the current research. Of interest, is the relationship these variables have to decision certainty in the academic major selection.

Self-Efficacy

Bandura (1997) uses the term "self-efficacy" to refer to beliefs I judgement) in one's capabilities to organize and execute the courses of action required to produce given attainments. "Efficacy beliefs," according to Bandura (1997) "influence the courses of action people chose to pursue, how much effort they put forth in given endeavors, how long they persevere in the face of obstacles and failures, their resilience to adversity, whether their thought patterns are self-hindering or self-aiding, how much stress and depression they experience" (p.3). A distinction between self-efficacy and self-confidence is warranted. Bandura (1989) distinguishes between the two: self-confidence refers to strength of belief, but does not specify directionality; self-efficacy implies a goal has been set. Self-confidence is a global perception of capability and ability. Self-efficacy is not concerned with ability level, but rather with internal judgements the individual possesses on what s/he can accomplish with those skills Bandura, 1986).

Self-efficacy theory states that the level and strength of self-efficacy will determine 1) whether or not a behavior will be initiated, 2) how much effort will result, and 3) how long the effort will be sustained in the face of obstacles. Self-efficacy serves a regulatory function for behavior which provides individuals with the ability to influence their own course of action and alter their environments (Bandura, 1997). We

make life decisions according to our perceived self-efficacy by undertaking activities and choosing situations we judge to be within our capabilities for success or avoiding those where failure is expected (Bandura, 1993). Self-efficacy mechanisms are posited to be major mediators of choice and development.

Environmental conditions also influence self-efficacy. According to Bandura (1986), in a responsive environment, performance achievements are rewarded and the outcomes people expect depend heavily upon internal beliefs that they can accomplish the skill. However, in a non-responsive environment, outcome and self-efficacy cannot be linked. For example, in an environment where all performances, even minimally acceptable performances, receive the same reward, but where circumstances are beyond the control of the individual, self-efficacy and outcome are not related. As a result, an individual in this kind of environment is more likely to give up trying because effort is expected to be futile rather than due to lack in individual confidence.

A resilient sense of efficacy requires experiences in overcoming obstacles through perseverant effort. Some setbacks and difficulty serve a beneficial purpose in providing opportunities to hone one's capabilities to exercise control over events and to teach that success usually requires sustained effort (Bandura, 1997). "Appraisal of personal efficacy is an inferential process in which the relative contribution of ability and non-ability factors to performance successes and failures must be weighted" (p.81).

Self-efficacy Versus Outcome Expectancy

Self-efficacy must be differentiated from outcome expectancy. An outcome expectancy is a person's estimate that a certain behavior will produce a resulting

outcome. Personal efficacy is the individual's conviction that s/he can successfully execute the behavior required to produce the outcome. The distinction lies in the individual's questioning his/her ability to perform the necessary behaviors to produce the desired outcome. The decision to attempt the behavior and the degree of effort and persistence the individual extends toward achieving the desired outcome in the face of obstacles or aversive experiences are contingent upon the strength of the individual's conviction in his /her effectiveness. (Bandura, 1997). The stronger the efficacy, the more active the efforts. Self-efficacy is just as important a determinant of one's performance as ability itself (Reeve, 1996).

People tend to undertake those tasks that they judge themselves to be capable of performing, while avoiding activities that they regard as beyond their abilities. Thus human behavior is also strongly influenced by how we perceive our potential effectiveness in coping with the demands of the environment (Ewen, 1988). This concept is known as perceived self-efficacy.

Determinants of Self-Efficacy

According to Bandura, (1997) efficacy beliefs are constructed from four principal sources of information. The first source is enactive mastery experiences that serve as indicators of capabilities. Second, vicarious experiences that alter efficacy beliefs through transmission of competencies and comparison with the attainments of others. The third source of information is verbal persuasion and allied types of social influences that one possesses certain capabilities. Finally, physiological and affective states from which people partly judge their capableness, strength, and vulnerability to

dysfunction. These four sources of information constitute the building blocks of self-efficacy.

Enactive mastery experiences provide the most influential source of efficacy information because they provide are based upon the individual's personal experiences (Bandura, 1997). Successes raise mastery expectations and repeated failures lower them over time. Focusing on one's successes should provide more encouragement and greater confidence than focusing on one's failures. "Efficacy beliefs strengthen substantially when performance accomplishments occur on difficult tasks, with little assistance or coaching, and relatively early in learning with few early setbacks" (Reeve, 1996, p.81). Experiencing some difficulty serves a beneficial function in helping crate resilient self-efficacy by overcoming obstacles through perseverant effort.

Efficacy attainments are partially influenced by vicarious experiences mediated through modeled attainment. By performing social comparison regarding the attainment of others, observers gain the opportunity to watch and judge the effectiveness of their performances on the same task. If successful performances on a task by multiple and diverse individuals are observed, personal efficacy expectations of the observer will increase and vice-versa. Vicarious experience as a source of information for self-efficacy is not as reliable as enactive mastery experiences, but it always contributes some amount of influence on the observer's efficacy (Reeve, 1996). This is especially true of vicarious experience when the observer has little experience with the task resulting in a lack of performance accomplishment information (Schunk, 1989).

Verbal persuasion, the third source of information on which to base efficacy belief, follows performance accomplishments and vicarious learning in potency. However, Schunk (1982; 1991) found that verbal persuasion has a twofold function 1) to provided a temporary boost in efficacy that enables an individual to put aside the self-doubt long enough to at least engage in the tasks and (2) to counter the occasional set back that might otherwise cause enough self doubt to interrupt persistence. This source of information occurs as a motivational experience- a pep talk, inspirational song, or encouraging speech that takes the individual's attention away from his or her personal weaknesses, past difficulties, and current obstacles toward personal strengths and past triumphs (Reeve, 1996). Other examples of this type of information are in the form of evaluative feedback, self-talk, imagery, and other cognitive strategies. This form of information input is employed by teachers, parents, coaches, and significant others.

The fourth source of information to inform efficacy beliefs comes for the physiological and affective state one experiences immediately prior to or during tasks performance. "Such information is provided through cognitive appraisal, such as associating physiological arousal with fear and self-doubt or with being psyched up and ready for performance" (Druckman & Bjork, 1994, p.180). The emotional arousal a situation causes can provide information for judging anxiety and vulnerability to stress. A mild level of arousal is helpful in most situations, however, high aversive arousal is often debilitating. Bandura (1997) noted that physiological sources of self-confidence are also gained from levels of fatigue, pain, and fitness, which act as sources of physical inefficacy.

Efficacy judgements, once formed, are not stable. They vary in strength and resistance to change. New information is constantly being evaluated. However, efficacy beliefs that have been based upon a large amount of information that has been consistent over time become firm beliefs and are subject to revision only with compelling disconfirmation.

The self-efficacy construct was first utilized to account for the varying results achieved with anxiety treatment. In a review of the literature, Druckman and Bjork (1994) found that the self-efficacy construct has been successfully applied to other psychosocial domains of functioning including, motivation, cognitive skill acquisition, academic settings (K-12) and for teachers, career choice and development, health and exercise behavior, and motor performance (for reviews of specific domains see; Pajares, 1996; Tshcanan, Moran, Hoy & Hoy, 1997; Feltz, 1988, Lent & Hackett, 1987; McAuley, 1992; O'Leary, 1985; Schunk , 1984). The theory has also been found to be equally applicable across cultures (Early, 1993 Matsui et al, 1987).

In academic settings, self-efficacy research has focused primarily on 1) the link between efficacy beliefs and college major and career choices and 2) the relationships among efficacy beliefs, related psychological constructs and academic motivation and achievement (Pajares, 1996).

Career Related Self-Efficacy

Career self-efficacy, based on Bandura's (1977) theory of self-efficacy expectations, was introduced by Betz and Hackett (1981). Both content dimensions of career choice behavior and process of career choice from a self-efficacy perceptive, i.e.,

how career and academic decisions are made are considered. "Career self-efficacy refers to areas in which individuals perceive certainty and uncertainty about their ability to plan and execute educational, occupational, and personal goals and objectives" (Peterson, 1993, p. 79).

Hackett and Betz (1981) initially postulated the role of self-efficacy expectations related to individuals' beliefs that they can successfully perform vocational behavior "because many behaviors or behavior domains are important in educational and career development, efficacy expectations are postulated to influence choice, performance, and persistence in career-related domains" (Betz, 1994). Career-related self-efficacy expectations were also researched because self-efficacy expectancies for vocational/ educational areas would provide more specific information than constructs such as global, academic, or performance self-esteem (Betz, 1994). It has been found that college students' beliefs about their educational and occupational capabilities were significantly related to the career options they considered (Betz & Hackett, 1981; Layton, 1984).

Self-efficacy theory permeates many of the interventions utilized to facilitate the career decision making process (Herr & Cramer, 1992). Career decision-making self-efficacy identifies the extent to which students have confidence about their ability to engage in educational and occupational information-gathering, goal planning, and decision making (Taylor & Betz, 1983). Bandura and Wood (1989) found self-efficacy for problem solving to be linked to the ability to remain effective analytical thinkers during instances of complex decision making. Low self-efficacy interferes with this

ability. Self-doubt prevents the individual from completing a careful analysis of all information that should be used in the decision making process.

Self-efficacy theory permeates many of the interventions utilized to facilitate the career decision making process (Herr & Cramer, 1992). Therefore, Taylor and Betz (1983) developed a measure of self-efficacy designed to investigate tasks required in career decision making and found that college student's efficacy expectations on the scale were significantly related to reported levels of indecision (Lent, Brown, & Larkin, 1984). The application of self-efficacy to career decision making in college has been utilized especially in relation to college major choice and academic performance. The larger career decision making process has been positively correlated with self-efficacy (Betz & Hackett, 1981; Taylor & Betz, 1983; Lent et al., 1986). The relationship found between self-efficacy and college major choice, academic performance, and career decision-making by previous research led to the inclusion of the variable in the current study in an attempt to ascertain the possible link between self-efficacy and decision certainty.

Research applications of self-efficacy theory to career decision-making skills suggest its utility as a major predictor of career indecision (Taylor & Betz, 1983; Hackett & Lent, 1992; Taylor & Popma, 1990), however no real measurement of decision certain had been performed. "Efficacy expectations, particularly those with respect to the skills of career decision making, have been found to be importantly related to career indecision" (Betz & Voyten, 1997, p. 180). Participants who were undecided generally reported less confidence in their ability to complete the necessary

career decision making tasks (Taylor & Betz, 1983). Self-efficacy beliefs serve as important cognitive influences on career decisions and achievements, helping to determine people's range of perceived options, and their success and persistence in chosen options (Lent, Brown, & Larkin, 1987).

Research, primarily using college students, has shown consistent support for the relation of career and academic self-efficacy beliefs to a variety of vocational and educational realms. Career self-efficacy has been correlated with various indices of career choice behavior (Betz & Hackett, 1981, 1983; Lent, Brown & Larkin, 1986; Wheeler, 1983). Several studies have shown that self-efficacy added significant unique variance beyond measures of ability and achievement or other models in predicting subsequent academic performance and persistence (Lent et al, 1984; Lent et al, 1987; Siegel et al, 1985. Self-efficacy has been found to be predictive of academic and career related choice and performance indices (Hackett & Lent, 1992); Multon, Brown, & Lent, 1991; Sadri & Robertson, 1993). Hackett and Betz, (1981) found that efficacy expectations are related to the degree of persistence and success in college major and career choice. Research by Lent, Brown and Hackett (1994) duplicated this finding at least for science and engineering majors. Research with college students has shown that career and academic self-efficacy beliefs are predictive of persistence in certain academic majors (Hackett, Casas, Betz, & Rocha-Singh, 1987; Lent, Brown & Larkin, 1984, 1986) and academic outcomes (Multon, Brown, & Lent, 1991) and are related to various indices of career choice behavior (Betz & Hackett, 1981; 1983; Lent, Brown, & Larkin, 1986; Taylor & Betz 1983).

Lent, Brown, and Larkin (1986) recommended that future research is needed that involves comparison of self-efficacy theory with alternative models that attempt to explain career-related achievement and persistence, for example career development theory and decision making theory. Robbins (1985) stressed "more research is needed that focuses on the relationship between reported self-efficacy expectations and actual performance of career -decision making behaviors" (1985, p. 71).

In a meta-analytical review of the literature, Multon, Brown, and Lent (1991) recommend that a significant gap in the literature on the application of self-efficacy theory to the vocational counseling realm is the need to test the relation of self-efficacy beliefs to established career decision variables in order to provide a fuller understanding of the role of self-efficacy in career indecision and choice.

Locus of Control

According to Julian Rotter (1966, 1990), locus of control is:

> The degree to which the individual perceives that the reward [of an event or activity] follows from, or is contingent upon, his/her behavior or attributes (internal loci) verses the degree to which s/he feels the reward is controlled by forces outside of self and may occur independently of his/her actions (external loci). (p.1)

While internal locus of control is contingent on perceptions about individual behavior or attributes, four types of beliefs in external control exist: belief that events occur as a result of luck or chance; belief that events occur due to fate; belief that events are controlled by powerful others; and the belief that the world is too complex to be predicted (Lefcourt, 1976, 1981). A person's locus of control is dependent upon the perception of whom or what is responsible for the outcomes of events in their life.

The construct of locus of control of reinforcement (Rotter, 1966) is derived from the conceptual background provided by social learning theory. According to this theory, reinforcements act to strengthen expectancy that a particular event or behavior will be followed by the same reinforcement in the future. According to Rotter, reinforcement acts to strengthen the expectancy that a particular behavior or event will be followed by that reinforcement in the future. Conversely, if a behavior is not followed by reinforcement then the expectation of future reinforcements will diminish. When the reinforcement occurs as the result of the individual's efforts, one will view reinforcement as contingent upon one's efforts. When it does not occur, the individual will tend to view personal efforts as unproductive and believe that external factors beyond his or her control responsible for the reinforcement.

When a person perceives the outcome of an action as the result of chance, luck, fate, or powerful others, s/he believes in external control. When an individual interprets an outcome as the consequence of his or her abilities or efforts, s/he believes in internal control (Vander Zanden, 1993). Individuals will attribute both effective and ineffective behavior to variables under either external or internal locus of control. For example, an individual with an external locus of control might contribute positive outcomes to superfluous events (i.e., that success will be achieved by wearing a red tie that day) (Ewen, 1988). Behavior-outcome expectancy theory postulates that in the absence of any information about a specific situation, an individual will tend to create expectancies based on past experiences in similar situations. Individuals with a more internal locus of control will have higher self-efficacy than individuals with a more external locus of

control. An extensive body of research on the construct has been conducted with adults and adolescents

The locus of control principle is based upon the concept that an individual's actions can be predicted by his values, expectations, and the circumstances of the situation: NP = f (FM & NV). Need potential (NP) or the capability of a set of behaviors to lead to the satisfaction of that need is a function of the expectation that these behaviors will lead to reinforcement (Freedom of Movement: FM) and the strength or value of these reinforcements (Need Value: NV). It is through freedom of movement that the construct, locus of control, becomes a factor in Rotter's theory (Rotter, 1954).

Freedom of movement is a generalized expectancy of success resulting from an individual's ability to remember and reflect upon prior expectancy-behavior-outcome sequences (Lefcourt, 1982). Specifically, Rotter (1954) conceptualizes freedom of movement as:

> The mean expectancy of obtaining positive satisfaction as a result of a set of related behaviors directed toward the accomplishment of a group of functionally related reinforcements. A person's freedom of movement is low if s/he has a high expectancy of failure or punishment as a result of the behaviors with which s/he tries to obtain the reinforcements that constitute a particular need. (p.194)

Of equal importance to the actual success and failure experiences to the expectancy-behavior-outcome sequence is the individual's interpretation of the causes of these experiences. The determination by the individual that the outcome of an experience resulted from one's own actions or was caused by external forces effects the strength of one's expectancy for related experiences of a similar nature, and consequently, one's behavior. Unless experiences are perceived as the result of one's actions, the

experiences will not be effective in altering the way in which one interprets things and functions. Experiences attributed to external forces will be judged as being beyond the control of the individual, and therefore unlikely to recur regardless of the individual's efforts.

Though locus of control is one psychological factor that has received substantial attention in the career-development literature, only recently has if been linked to college student career development. These recent studies have revealed significant relationships between college students' locus of control and various measures of career development (Noe & Steffy, 1987; Freidrich, 1988; Luzzo, 1993 a, b, c). Students with an internal locus of control exhibit higher levels of career development then students with an external locus of control. This relationship exists in the areas of career exploration activities, career expectations, vocational identity, and career decision-making skills and attitudes. Following Super's (1957) reasoning that choosing an occupation demands the consideration of individual characteristics, an individual with a poorly formed sense of self is more likely to by externally controlled and indecisive regarding career choices viewing it beyond their personal control to make a choice. An externalized locus of control should be associated with a more chronic form of career indecision.

Several investigations have provided evidence of the relationship between locus of control and career maturity (Luzzo, 1993b; Wu, 1991). These studies found that the more internal an individual's locus of control, the more mature the individual's attitudes toward career development. Locus of control has also been linked to self-efficacy for career decision making. Taylor and Pompa (1990) found that individuals with an

internal locus of control also had greater self-efficacy for career decision making. In this study, it is considered important to include locus of control as an independent variable because research has not shown results that clarify the nature of the relationship between self-efficacy beliefs and other expectancy constructs (Pajares, 1996).

Chapter Summary

This chapter reviewed related literature and research pertinent to academic major decision certainty and the variables introduced and defined in Chapter 1. A description of the methodology for the study is provided in Chapter 3.

CHAPTER 3: METHODOLOGY AND PROCEDURES

This chapter provides a description of the methodology for the study. Included is a description of the sampling design, the instrumentation, data collection and processing, and data analysis procedures.

Sampling Design

The sample for this study was comprised of students attending Louisiana State University during the Summer 1999 semesters A and B. All 105 faculty members teaching general education courses were solicited for participation at the beginning of the summer. Students enrolled in these general education courses were used in order to obtain a large sample of students in various disciplines, at various levels of credits earned, and with diverse degrees of major commitment. Total undergraduate enrollment for the Summer 1999 was 8,675. Of the total enrollment, 6,019 students were enrolled in courses that fulfill the general education requirement. Of those 6,019 students, 1634 students were enrolled in the courses of the 34 faculty members that gave consent for participation in the study. Usable completed instrument sets were obtained from 52% of the available student population (n=853). The sample (n=853) comprised 10% of the total enrollment figure for Summer 1999 and 14% of the total enrollment in courses that fulfill the general education requirement. Student participation was voluntary.

The data collection and processing section of this chapter (p.101) further provides more details. A table which summarizes the general education requirements, the courses that fulfill the general education requirement at LSU, the courses that were offered during Summer 1999 that fulfill general education requirements and utilized in the sample

comprise Appendix A. The regulations, including a listing of courses, regarding fulfilling the general education requirements (replicated in Appendix A) can be found on pages 71-74 of the 1998-1999 Louisiana State University General Catalog.

Instrumentation and Measures

A number of different instruments were used in the study to collect data measuring each of the variables discussed in Chapter 1. (See Appendix C for a copy of the instruments). To provide data about the factors related to major choice and decision certainty, a variety of instruments were utilized. All students were asked to complete a Demographic Information Form, which was used to collect demographic data. Locus of control data was evaluated using Rotter's (1966) Internal-External Control of Reinforcement Scale (I-ECRS). The Career Decision-Making Self-Efficacy Scale (CDMSES) developed by Taylor and Betz (1983) was used to measures students' academic major self-efficacy beliefs. The Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) developed specifically for this study was used to measure students' levels of academic self-efficacy motivation beliefs. The Student Academic Self-Appraisal Inventory (SASI) was used to provide data about students' self-appraisal during the major selection process. Students who had selected a major also completed the Academic Major Decision Certainty Scale (AMDCS). This Scale was used to measure the degree of commitment to, and contentment with, the major selection after a major decision was made.

A scale comprised of five items was included in the set of measures as an empirical check for respondents who might be influenced to answer personal questions

in a socially desirable (rather than honest) manner (Crowne & Marlowe, 1964). The items of the Social Desirability Scale (SDS) and the items comprising the Student Academic Self-Appraisal Inventory (SASI) were combined into Opinionnaire III (see Appendix B) for the purpose of disguising the social desirability items.

Demographic Information Form

Several survey questions were used to collect demographic information such as age, sex, race, classification, college GPA, high school GPA, financial aid and scholarship awards and major status for documenting characteristics of the sample and for framing some supplemental analyses.

Internal-External Control of Reinforcement Scale (I-ECRS)

Locus of control was assessed by Rotter's (1966) scale, which measures individual differences in a general belief in external control. An external locus of control refers to the perception that events are unrelated to one's own behavior and therefore beyond personal control. Five factors are identified in responses to the Rotter Scale: general luck (GL), political control (PC), success via personal initiative (SV), interpersonal control in social relations (IC), and control of academic situations (AS). A copy of the instrument can be found in Appendix B. The scale includes 29 paired statements and utilizes a forced choice format (six of the statements are filler items). Each pair contains one internal statement and one external statement. A dichotomous choice is made between the two alternatives as the following item from the scale shows:

12. a. In my case getting what I want has little or nothing to do with luck.
b. Many times we might just as well decide what to do by flipping a coin.

Participants chose the statement in each pair for which they held the strongest belief. A

locus of control score is determined by summing the number of items chosen by a respondent that indicate a belief in the external locus of control. Higher scores on the I-E scale, therefore indicate an external locus of control, whereas lower scores on the scale indicate an internal locus of control. Scores may range from 0 to 23. Rotter (1966) reported test-retest reliability coefficients for the I-E of .60 for males and .83 for females over a one-month interval. The instrument also exhibits moderate internal-consistency coefficients ranging from .65 to .79 (Taylor, 1982).

Numerous validation studies have been conducted (Rotter, 1966; Leftcourt & Ladwig, 1965; Franklin, 1963; Blackman, 1962; Johnson, 1961; Cardi, 1962). Mean score comparisons were made between a study by Lefcout and Ladwig (1965) utilizing an inmate sample (8.97) and a study by Rotter (1966) on peace corps volunteers (5.94). As conceptually assumed, the internal or external orientation of the prisoners as more external was confirmed. The mean scores of high school seniors on this scale was also used for validity measurement (Franklin, 1963). Those high school seniors who intended to extend their education beyond high school were found to be significantly more internal than those who did not intend to extend their education in college.

The validity of the scale was also ascertained by comparisons with a number of other locus of control instruments. The early 60 item version of the scale was compared with the James-Phares measure producing correlations between .55 and .60 (Blackman, 1962; Johnson, 1961). The final version of the Scale was found to have a biserial correlation of .61 when compared to a measure of internal-external control used in a study of academic failure (Cardi, 1962).

The Career Decision Making Self-Efficacy Scale (CDMSES)

The items on the CDMSES were derived from Crites'(1965) career maturity construct, with a particular emphasis on the affective component of career maturity and the assessment of attitudes toward the career decision making process. The scale identifies the extent to which students feel confident about their ability to engage in educational and occupational information-gathering and goal planning activities. The scale is based on the 5 Career Choice Competencies postulated in Crites' (1978) model of career maturity and assessed by the Career Maturity Inventory (Crites, 1978). The item content of the scale includes behaviors pertinent to self-appraisal, gathering occupational information, selecting goals, making plans, and solving problems i.e., *Select on major from a list of potential majors you are considering. Decide whether or not you will need to attend graduate or professional school to achieve your career goal.* Ten items reflect each competency. CDMSES subjects are asked to rate each item on the degree of confidence in the ability to successfully complete the task. The instrument is included in Appendix B. Responses were obtained using a 5-point Likert scale ranging from Complete Confidence (5) to No Confidence (1). A total score reflecting self-efficacy expectations with regard to all 50 career decision-making tasks is calculated by summing the confidence rating for the 50 items resulting in a maximum possible score or 250.

Luzzo (1993a) found internal consistency reliability ranges from .86 to .89 for the subscales of the CDMSES and .97 for the total score and reported six-week test-retest reliability of .83. The instrument has both concurrent and predictive validity

(Taylor & Popma, 1990). Evidence of concurrent (or convergent) validity was provide by significant correlations with Osipow, Carney, and Barak's (1976; Osipow, 1987) Career Decision Scale. Correlations with the Career Decision Scale (CDS) ranged from -.29 with the Problem Solving Subscale to -.48 with Goal Selection; the correlation between the total CDMSES and the CDS scores was -.40 (Taylor & Betz, 1983). Thus higher levels of career decision-making self-efficacy are associated with lower levels of career indecision. Taylor and Popma (1990) reported r's of -.38 to -.59 with career indecision and of .32 to .55 with decidedness.

Evidence for predictive validity was provided by regression analyses indicating that career-decision making self-efficacy was a stronger predictor of career indecision than was general self-efficacy, types of occupations considered, or ability (Taylor & Betz, 1983). Taylor and Pompa (1990) also found the CDMSES was the only significant predictor of career indecision, accounting for 29% of the variance. Evidence of discriminant validity (Campbell & Fiske, 1959) was provided by low relationships between the CDMSES scores and the scholastic aptitude test. Relationships of total CDMSES scores with SAT scores was $\underline{r}$=.19 (Taylor & Betz, 1983).

The Betz and Hackett (1981) research is considered by Bandura (1982) to be an adequate operationalization of his construct of self-efficacy as applied to career decision-making. Evidence for construct validity comes from research supporting the postulated cause and effects of occupational self-efficacy. Empirical research supports the nomological network (Cronbach & Meehl, 1955) of the construct of career-related self-efficacy as measured by the CDMSES, and thus provides evidence of construct

validity. Taylor and Popma (1990) reported that the CDMSES significantly differentiated three groups of students categorized on the basis of college major status.

More in-depth concurrent, predictive, and discriminant validity evidence is available in the CDMSES manual (Betz & Taylor, 1994).

Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS)

The items on the SAMSEMS are designed to measure the motivation component within self-efficacy. The SAMSEMS is a three-item scale specifically developed for this study to provide an overall measure of the amount of energy/effort and persistence/ perseverance students put forth to accomplish selection of the academic major in the face of obstacles, difficulties, and failures (see Appendix B). Students respond using a four-point Likert Scale ranging from 1= Little or None to 4= A Large Amount.

This measure was adapted from a self-efficacy measure originally designed for teachers (Loup & Ellett, 1994). Loup and Ellett (1994) reported subscale alpha reliabilities on three factored subscales ranging from .89 to .95. Test-retest reliabilities ranged from .80 to .65 ($p<.05$). Utilization of the instrument in a second study with a sample of 1,009 elementary and secondary teachers in 29 schools yielded alpha coefficients of .97 and .94 on a two factored subscale (Ellett et al, in press). When the instrument was adapted for a study with a sample of college faculty members, alpha reliabilities ranged from .73 to .89 on two factored subscales (Clarke & Ellett, 1997).

Student Academic Self-Appraisal Inventory (SASI)

This five-item measure was specifically developed for this study in order to measure the degree of self-appraisal activity students undergo in relation to the

academic major selection process i.e., *I spend a lot of time think about how my current (or potential) academic major matches my personal needs, abilities, and interests.* Students respond to each item using a four-point Likert Scale ranging from 1= Strongly Agree to 4= Strongly Disagree.

Content validity of this new measure was explored using six experts in the field of higher education (counseling, higher education administration, education research faculty) and three counselors (career and academic major advisors) who were asked to assess the usability of the instrument, the clarity of items, etc. These experts reviewed the measure by assessing the ability of the items to accurately represent common theory and practice in the field. Feedback obtained from the experts led to revision of the instrument in its current format (See appendix B).

In addition to using experts to insure validity, a pilot group of undergraduate students (n=23) was used in an initial screening procedure. In order to strengthen the face validity of the instrument and to check for clarity of language, understandability of instructions, etc. pilot testing was conducted as reported starting on page 103.

Social Desirability Scale (SDS)

As previously mentioned the Social Desirability Scale was included to empirical check for respondents who might be influenced to answer personal questions in a socially desirable (rather than honest) manner (Crowne & Marlowe; 1964). Sample items from the SDS which illustrate how social desirability was checked are: *I would never think of letting someone else be punished for my wrong doing* and *I am always attentive to the person I am with.*

Academic Major Decision Certainty Scale (AMDCS)

This instrument is comprised of sixteen items and was specifically developed for this study in order to measure the degree of commitment to, and contentment with, the academic major selection once it has been made. Item development was based upon the conceptual definition of decision certainty utilized in the study. Items were also based upon the various decision making models, tasks, and processes discussed in Chapter 2. Eight items are included under the sub-headings of commitment and contentment. An example of a commitment item is: *When scheduling classes, I give priority to those that meet the requirements of my academic major*. An example of a contentment item is: *Earning a degree in my current academic major will fulfill my more immediate personal and professional needs*. Student responses are based on a four-point Likert Scale ranging from 1= Strongly Agree to 4= Strongly Disagree. Only students who have formally declared a major on the official University record completed this Scale.

Content validity of the instrument was explored using six experts in the field of higher education (counseling, higher education administration, education research faculty) and three counselors (career and academic major advisors) who were asked to assess the usability of the instrument, clarity of items, etc. These experts reviewed the measure by assessing the extent to which the items operationalized the conceptual definition of decision certainty, and for accuracy in depicting the processes and tasks outlined in the models of decision making. The experts were asked to sort the sixteen items into the two categories of contentment and commitment. Feedback obtained from the experts yielded the instrument in its current format shown in Appendix B.

In addition to using experts to explore validity, a pilot group of undergraduate students (n=23) was used in an initial screening procedure. In order to strengthen the face validity of this new measure and to check for clarity of language, understandability of instructions, etc., pilot testing was conducted as described in the section that follows.

Pilot Testing

Prior to administering the survey instruments to the students, a pilot test was conducted with 23 members of the target population- undergraduate students enrolled in Summer school at Louisiana State University. The pilot test was designed to examine the face validity and readability of the questionnaire, the length of time needed to complete the questionnaire, and to identify any general problems or confusing aspects student might encounter while answering the questionnaire. The researcher administered the survey to individual students who were obtained through convenience sampling. - sophomore, junior, and senior level college students enrolled in summer school at Louisiana State University. Freshman students were not utilized for the pilot testing due to their inexperience with university procedures and overall naiveté related to the college experience and academic major selection process. Considerations of classification, race, age, etc were made to ensure representation of the overall target population. A comparison of demographic features showed that, with the exception of the exclusion of freshmen, the sample was quite similar to the larger sample of students in the study.

The time it took students to complete the survey was obtained by recording the beginning and ending times for each student. Each student was also asked the following

series of questions: a) What difficulties did you have in completing the questionnaire? b) Were the written and verbal instructions clear, adequate, and easy to understand? c) Did you encounter difficulty with any section or individual item of the questionnaire? d) Do you have any recommendations about how the questionnaire can be improved?

Generally, students who participated in the pilot study were able to answer the questions without any difficulty. The questionnaire required between 16 and 25 minutes to complete. Only minor modifications were made to the instrument in order to improve readability and completion. For example, the filler items of the Rotter scale were removed to shorten the time required to complete the survey. With these modifications, the final set of measures was developed and prepared for administration to the larger student sample.

Data Collection and Processing

Participants were solicited from intact classroom groups. Only classes that fulfilled the general educational requirements were used (Appendix A). The faculty member assigned to the class was contacted first and permission was obtained for the survey to be completed during a regularly scheduled class period. Appendix B includes a copy of the letter sent to faculty requesting their participation. The sample was comprised of students in courses of faculty who granted permission to participate in the study. Table 1 of Appendix A indicates the general education courses offered during the Summer 1999 term and the course enrollments utilized in the study.

Students were solicited on a voluntary basis after a full explanation of informed consent and confidentiality. The instruments described above, along with a

demographic questionnaire, were administered by individual faculty during a regularly scheduled class period.

Machine scoreable data collection forms were produced through the Louisiana State University Measurement and Evaluation Center (MEC) to ease data entry. Directions for administering the instrument packet are found in Appendix C. All data were collected in a manner that insured the anonymity of participants and was treated with confidentiality. For tracking purposes, instruments were coded by the last four digits of the social security number and course call number.

Data Collection Time Lines

The packets containing pencils, consent forms, questionnaires, and instructions were hand delivered at the start of the summer sessions (mid-June) to each faculty member who agreed to participate in the study. Faculty members were allowed to coordinate the administration of the questionnaire with their pre-designed class syllabus, therefore, the survey could be administered during any class period held during the Summer sessions. Once students had completed the survey, the faculty member contacted the researcher and arrangements were made to pick up the questionnaire in person within a 48-hour period. All sets of measures were administered and returned to the researcher by August 1, 1999. As sets of measures were returned, each was reviewed to ensure that instructions for filling in responses and erasing changes were followed. When needed, bubbling in and erasing improvements were made to responses. These improvements were made to increase accurate scanning without effecting the integrity of the responses. All completed surveys were delivered to the

Measurement and Evaluation Center at Louisiana State University on August 9, 1999. The scanning of the documents and the creation of the data file occurred over the next four weeks.

Data Analyses

A variety of data analyses were completed to examine the characteristics of the sample, the various instruments used and to test the formal hypotheses and research questions framing the study. These analyses included the following statistical procedures:

1. Descriptive statistical analyses of all demographic variables and instrument items, and all study variables to clarify, organize, and summarize the data
2. Factor analyses using individual students as the units of analysis to reduce the measures into a smaller number of empirically-derived latent constructs
3. Internal consistency (Cronbach Alpha) reliability analyses of sub-scales and/or total scores for all measures.
4. Bivariate correlations among all instrument sub-scales and instrument totals as appropriate using individual students as the units of analysis, to ascertain relationships between and among the independent and dependent variables
5. Multiple regression analyses to examine the relative contribution of the study variables in explaining variation in academic major decision certainty
6. Additional causal comparative analyses for selected subgroups in the study (e.g., comparisons by major declared status, major changed, age, classification, high school and college GPA, father's and mother's education level, etc.)

Descriptive Statistics

For all demographic, dependent, and independent variables, summary statistics were completed including means, standard deviations, ranges of scores, and means expressed as percentages of the maximum possible score for each item. The statistics were compiled and reported for the total sample.

Factor Analyses

The data compiled for all scales utilized in the study was subjected to factor analysis procedures. Each instrument was subjected to a series of factor analysis procedures to test the dimensionality of the underlying constructs. An unconstrained principal component solution was completed for each measure followed by analyses that extracted from one to multiple factors. Orthogonal rotations (VARIMAX procedures) were utilized since identifying a set of independent factors was desired. These analyses were completed for the entire sample. Factor to factor and item to factor intercorrelations were also computed with students as the unit of analysis.

The Social Desirability Scale and the Student Academic Self-Appraisal Inventory were combined into Opinionnaire III for the purpose of disguising the social desirability items during data collection. Therefore, Opinionnaire III was factor analyzed intact in order to confirm that each scale would factor out together demonstrating that the items of each scale would group together.

Three general decision making rules were established and utilized for all the measures in interpreting the results of these factor analyses and in selecting the solutions which represented the best conceptual and statistical interpretation of the data.

First, an item had to have a minimum loading of r = .33 in order to be retained on a factor. Second, the item was retained on only one factor- the factor on which it had the highest loading. Third, if an item loaded r = .33 or greater on more that one factor, the item was retained on a single factor if the difference between the squared loadings (r^2) was 10% or greater.

Factor analysis procedures yielded one-factor solutions for the items of the Student Academic Major Self-Efficacy Scale Motivation (SAMSEMS), the Student Academic Self-Appraisal Inventory (SASI), and the Internal-External Locus of Control Scale. Factor analysis procedures also yielded a one-factor solution for the Social Desirability Scale (SDS) as expected; confirming these items separated from the Student Self-Appraisal Inventory (SASI) items.

Multiple factor solutions were also utilized in the study. Results from the four-factor solution for the items of the Career Decision-Making Self-Efficacy Scale (CDMSES) were determined to be the most acceptable representation of the data thus four subscales were utilized in subsequent analyses. Results from the three-factor solution for the Academic Major Decision Certainty Scale (AMDCS) were determined to be the most acceptable representation of the data resulting in three subscales of the AMDCS to be used in subsequent analyses.

The items retained in the one-factor solutions of the Career Decision Making Self-Efficacy Scale (CDMSES) and the Academic Major Decision Certainty Scale (CDMSES) were also utilized in subsequent analyses to measure career decision making self-efficacy and academic major decision certainty as uni-dimensional factors.

Reliability Analyses

In order to examine the internal consistency reliability of the scales and subscales utilized in the study, the Cronbach (1957) alpha reliability procedure was utilized. For the Rotter Internal Verses External Control of Reinforcement Scale, the Student Academic Major Self-Efficacy Motivation Scale, and the Student Academic Self-Appraisal Inventory items retained by the one factor solution of factor analyses procedures were utilized. For the analysis of the Career Decision-Making Self-Efficacy and Academic Major Decision Certainty Scales, both multi-dimensional subscale scores (obtained from items retained in the multiple factor solution) and scores for global (uni-dimensional) constructs (obtained from items retained in a one-factor solution of the measures) were used.

In order to examine the stability of the various measures utilized in the study, the set of measures was administrated twice to an additional sample of Louisiana State University students using a three-week interval between the first and second administrations. Correlation coefficients were computed between each individual's score on the two different testing occasions in order to determine stability of the measures over time. In addition, descriptive statistics obtained for the additional sample from the test-retest administrations were compared to the descriptive statistics obtained from the administration of the set of measures to the larger sample (n=853).

Correlation Analyses

A series of bivariate correlation analyses was completed to examine relationships between the various independent variables, factored subscales, and the

dependent variable. The independent variables in the study were operationalized by the career decision making self-efficacy, student academic major motivation, student academic self-appraisal, and locus of control of reinforcement. The career decision making self-efficacy variable. One series of correlation analyses was completed using the items retained on the one-factor solution for all variables: career decision making self-efficacy, student academic major self-efficacy, self-appraisal, locus of control, and student academic major self-efficacy. A second series of correlation analyses was completed utilizing items retained on the one factor solution for the academic major motivation self-efficacy, self-appraisal, and locus of control variables and the factored subscales of the career decision making self-efficacy and academic major decision certainty variables.

Regression Analyses

In order to provide additional information regarding relationships between the dependent and independent variables, a series of multiple regression analyses were computed. For these analyses, the dependent variable of academic decision certainty was regressed on the independent variables. Regression analyses were completed regressing the Academic Major Decision Certainty Scale (AMDCS) as a global (uni-dimensional) contruct on the four independent variable measures of the Career Decision Making Self-Efficacy Scale (CDMSES), the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS), the Student Academic Self-Appraisal Inventory (SASI), and the Internal versus External Control of Reinforcement Scale (I-ECRS) as global (uni-dimensional) constructs. Subsequent regression analyses were completed

regressing each of the three factored subscales of the academic major decision certainty contruct on the four independent variables of career decision making self-efficacy, academic major self-efficacy motivation, academic major self-appraisal, and locus of control as global (uni-dimensional) constructs and the four subscales of the CDMSES.

Causal Comparative Analyses

Additional causal comparative analyses were completed for selected subgroups in the study. In addition to the t-test analyses completed on the test-retest supplemental sample, t-test analyses were completed in order to compare those students who attested to have changed their major to those who indicated that they had never changed their major. These comparisons were made between the two groups on the study variables of career decision making self-efficacy, student academic major self-efficacy motivation, student academic self-appraisal, locus of control of reinforcement, and academic major decision certainty. In addition, a series of one-way analyses of variance (ANOVA's) was also completed in order to examine differences between class levels (freshman, sophomore, junior, senior) on each of the study variables. Post-hoc t-test procedures (Tukey) were completed for significant ANOVA's ($p<.05$) in each analysis.

Chapter Summary

Chapter 3 provides a description of the methodology for the study. Included is a description of the sampling design, instrumentation, data collection and processing, and data analyses procedures. Information regarding pilot testing, data collection timelines, and test-retest procedures is also included in this chapter. Chapter IV that follows, presents the results of the study.

CHAPTER 4: SUMMARY OF RESULTS

Chapter 4 describes the results of the data analyses completed in the study. The following analyses and results are described in this chapter: a) descriptive statistics for the sample; b) descriptive statistics for the measure items, c) descriptive statistics for the independent and dependent variables: d) factor analyses of the career decision making and academic major motivation self-efficacy scales, the locus of control, self-appraisal, and decision certainty measures; e) internal consistency reliabilities of the measures; f) intercorrelations among the measures and subscales; g) multiple regression analyses to examine multivariate relationships pertinent to explaining the variation in decision certainty; h) analyses related to the major research hypotheses; and g) analyses pertinent to supplemental research questions.

Summary of Descriptive Statistics of Study Measures and Sample

The sample for the study consisted of students attending Louisiana State University during the Summer 1999 A and B sessions who enrolled in courses approved by the University to fulfill general education requirements under faculty members who consented to allow their classes to be included in the study. A total of 873 students participated in completing the set of measures, with usable data received from 853 students. The set of measures which were not included in the data analysis were excluded for a variety of reason, primarily for gross non completion of items (over thirty percent of the items unanswered). Multiple responses on items where only one response was appropriate were treated as non-responses. Surveys were also excluded for obvious failure on the part of the student to complete the instrument in an honest

manner (large amount of items skipped or patterned responses). Each set of measures was examined individually.

Table D.1 of Appendix D provides a detailed profile of personal demographics for the sample on age, gender, race, marital status, parental status, high school GPA, college GPA, academic classification/class level, college, father's education level, mother's education level, financial assistance, housing status, major declaration status and time, status on and reasons for changing major. Percentages reported for the demographic categories that do not total to 100% are due to missing data. Table 4.1 is a shorter version of Table D.1 of Appendix D.

The age of respondents ranged from 18 to 82 years. The majority of the students were in the traditional college student age range of 18 to 24 years (81.6%) with age breakdown as follows: 18 (12.9%), 19 (18.6%), 20 (14.4%), 21 (11.9%), 22 (10.7%), 23 (4.7%), and 24 (3.4%). Those under the age of eighteen accounted for 8.5% of the sample and were excluded due to lack of parental consent. Those 25 years of age or older accounted for the remaining 14.9% of the sample. By gender, females (53.8%) participated in the study more than males (46.2%). By race, Whites comprised the largest sub-sample (71.2%), followed by African Americans (18.8%), Asian Americans (4.4%), Hispanics (2.6%), and Native Americans (.7%). 2.3% of the respondent coded their race as other. Respondents indicated marital status as single (89.1%), married (8.8%), and other (2.1%) and 90.2% of the sample indicated they had no children.

The majority of the respondents reported their high school GPA was between 3.51 and 4.0 (33%), followed by 3.01 and 3.5 (28.6 %), 2.52 and 3.0 (25.3%), and

Table 4.1

Profile of Personal Characteristics of Respondents (n=853)

Characteristic	Frequency	Percentage of Total
Age		
<18	17	8.5
18	110	2.9
19	158	18.6
20	122	14.4
21	101	11.9
22	91	10.7
23	40	4.7
24	29	3.4
>24	156	18.3
Frequency Missing	3	
Gender		
Female	456	53.8
Male	392	46.2
Frequency Missing	5	
Race		
African American	159	18.8
White	601	71.2
Hispanic	22	2.6

(table continues)

Characteristic	Frequency	Percentage of Total
Native American	6	.7
Asian American	37	4.4
Other	19	2.3
Frequency Missing	9	
High School GPA		
3.51 - 4.0	272	33.0
3.01 - 3.5	235	28.6
2.52 - 3.0	208	25.3
2.02 - 2.5	72	8.7
< 2.02	36	4.4
Frequency Missing	30	
College GPA		
3.51 - 4.0	135	16.9
3.01 - 3.5	187	
23.5		
2.51 - 3.0	232	29.0
2.01 - 2.5	143	17.9
1.53 - 2.0	70	8.8
<1.53	31	3.9
Classification		
Freshman	174	20.7

(table continues)

Characteristic	Frequency	Percentage of Total
Sophomore	212	25.3
Junior	199	23.7
Senior	232	27.7
Other	22	2.6
Frequency Missing	14	
Father's Education Level		
High School Diploma or Less	201	24.4
Post Secondary Education (No Bachelors)	208	25.3
Earned Bachelor's Degree	215	26.1
Graduate School Attendance & Degree	200	24.3
Frequency Missing	9	
Mother's Education Level		
High School Diploma or Less	215	25.9
Post Secondary Education (No Bachelors)	268	32.3
Earned Bachelor's Degree	186	22.4
Graduate School Attendance & Degree	162	19.4
Frequency Missing	22	

2.02 and 2.5 (8.7%). Only 4.4% of the sample reported a high school GPA as 2.0 or less. The majority of the respondents reported their college GPA was between 2.51 and 3.0 (29%), followed by 3.01 and 3.5 (23.5%), 2.01 and 2.5 (17.9%), 3.51 and 4.0 (16.9%), and 1.53 and 2.0 (8.8%). Only 3.9% of the sample reported their college GPA was less than 1.53.

Academic classification of the respondents ranged from freshman (20.7%) to senior (27.7%) representing the entire undergraduate population fairly evenly. Only 2.6% of the sample indicated other as the appropriate classification. Sophomores (25.3%) and juniors (23.7) comprised the remainder of the sample. The demographic breakdown for the sample was compared to the personal characteristics of all LSU students attending Summer sessions A and B as shown in Table D.2 (Appendix D).

Summary of Descriptive Statistics for Measurement Instrument Items

Descriptive statistics were calculated for each measure used to operationalize the dependent and independent variables in the study. For the measures of career decision making self-efficacy (CDMSES), student academic major self-efficacy motivation (SAMSEMS), self-appraisal (SASI), and academic major decision certainty (AMDCS), the means, standard deviations and the percentages of the maximum possible score for each item were computed. For the measure of locus of control (I-ECRS), frequency distributions were calculated.

The number of responses for each measure and for each item on the multiple item measure remained the same. The raw data were examined prior to analyses for missing responses and, in order to maximize the number of useable responses for the

computation of descriptive statistics, the item grand means were substituted for missing responses for measures where a mean was calculated. When a mean score was not calculated the number of missing responses is shown. Tables of these descriptive statistics are located in Appendix E. An individual table including the content of each item is provided for each measure.

Table E.1 in Appendix E summarizes the descriptive statistics for the 50 items of the Career Decision Making Self-Efficacy Scale (CDMSES). For this measure, item means ranged from a low of 3.07 for item 7 (Find information about companies who employ people with college majors in English) to 4.47 for item forty-six [Describe the type of lifestyle you would like to live].

Descriptive statistics for the three items of the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) are summarized in table E.2. Item means ranged from a low of 2.47 on item 3[(To what extent would failure to accomplish your academic major goal(s) ***or*** your goal(s) to obtain information about a possible academic major course of study result in DECREASING EFFORT(S) to accomplish future academic major goal(s)] to a high of 3.45 on item 2 [If there are difficult or uncertain obstacles to overcome in accomplishing your current declared academic major ***or*** to obtain information about a possible academic major course of study, how much persistence/perseverance do you put forth to accomplish your academic major goal(s)].

Table E.3 summarizes the descriptive statistics for the five items of the Student Academic Self-Appraisal Inventory (SASI). Item means ranged from a low of 2.98 for

item 2 [I frequently discuss with others whether I have made (or will make) an academic major decision that best reflects my capabilities and career aspirations.] to a high of 3.29 on item 3 [I frequently think about the positive and negative aspects of my current (or potential) academic major].

The descriptive statistics for the sixteen items of the Academic Major Decision Certainty Scale (AMDCS) are summarized in Table E.5. Item mean scores range from a low of 2.53 on item eleven [When I think about pursuing the requirements of my current academic major, I experience a lot of anxiety and stress.] to a high of 3.53 on item 5 [When scheduling classes, I give priority to those that meet the requirements of my academic major].

Summary of Results of Factor Analyses

Factor analysis procedures were completed on all measures utilized in the study prior to conducting the analyses relevant to the primary research hypotheses and secondary research questions. Factor analyses were conducted in order to empirically identify conceptual dimensions (latent constructs) of the set of measures. Many of the factor analysis tables are contained within this chapter. Appendix F contains additional summary tables of item communalities and factor structure coefficients from retained items in these analyses. Items were retained on factors given the decision rules outlined in Chapter III (p.98). Results of these analyses are reported in sections that follow.

Career Decision Making Self Efficacy Factor Analyses

For this study, an exploratory principal components factor analysis was completed for the 50 items comprising the Career Decision-Making Self-Efficacy Scale

to assess the dimensionality of the career decision making self-efficacy construct. An unconstrained solution was computed followed by solutions systematically extracting from one to seven factors. These procedures were completed for the entire student sample (n=853). Table 1 of Appendix F provides a summary of the one-factor, principal components solution for the Career Decision-Making Self-Efficacy Scale. Factor loadings (correlations) for items retained in this solution ranged from a low of .36 to a high of .73. All fifty items demonstrated loadings meeting the minimum criteria for retention in the one-factor solution (.33). Approximately 35% of the variance in the data was explained by the one-factor solution.

Results for the four-factor solution (Table 4.2) were determined to be the most acceptable multiple factor representation of the data. Both the three and five-factor orthogonal solutions also provided reasonable conceptual fits with the findings, however these solutions had characteristics which rendered them less suitable. Thirteen of the fifty items in the three-factor solution did not load (i.e., <.33), and the solution accounted for 42.76% of the total item variance. In the five-factor solution, only eleven of the fifty items failed to load and the total item variance accounted for was 48.26%. In this solution, only two items loaded on the fifth factor suggesting a rather weak conceptual dimension.

A total of thirty-two items loaded on the four-factor orthogonal solution; ten on Factor I, nine on Factor II, six on Factor III, and seven on Factor IV. Factor I, identified as Future Orientation, was comprised of items pertaining to students' confidence in their abilities to accomplish aspects of vocation and academic goals related to their career

Table 4.2

Summary of the Rotated Communalities and Factor Structure Coefficients for Items Retained in the Four-Factor Orthogonal Solution for the Career Decision Making Self-Efficacy Scale (CDMSES) (n=853)

CDMSES Item #	Communality Estimates[a]	Factor Coefficients I	II	III	IV
1	.30	.14	.26	.05	**.46**
2	.38	.19	.24	**.47**	.26
3	.52	.22	**.63**	.00	.27
4	.47	.20	**.62**	.21	.03
5*	.43	.11	.45	.42	.18
6	.44	.15	**.54**	.31	.18
7	.49	.01	.12	**.67**	.13
8	.53	.24	**.64**	.12	.20
9	.45	.34	**.50**	.24	.16
10*	.49	.40	.49	.17	.16
11*	.41	.21	.43	.13	.40
12	.43	.06	.08	**.61**	.20
13	.55	.32	**.64**	.16	.16
14	.46	.21	.34	**.54**	.10
15	.33	.13	.11	.24	**.49**
16	.53	.21	**.66**	.14	.14

(table continues)

CDMSES Item #	Communality Estimates[a]	Factor Coefficients I	II	III	IV
17*	.49	.36	.41	.45	-.01
18	.36	.01	**.47**	.32	.18
19*	.47	.24	.40	.50	.09
20*	.41	.14	.29	.33	.44
21*	.47	.36	.50	.19	.24
22*	.53	.43	.35	.47	.02
23	.42	-.02	.12	.16	**.61**
24*	.43	.41	.43	.25	.14
25	.44	.24	.26	.01	**.57**
26	.28	.31	.19	.17	**.34**
27	.55	.41	**.58**	.18	.13
28*	.25	.22	.09	.32	.30
29	.47	.21	.02	**.63**	.20
30	.23	**.34**	.07	.23	.25
31*	.49	.44	.40	.28	.23
32	.44	.34	.23	**.50**	.15
33*	.64	.51	.58	.05	.20
34	.58	**.67**	.24	.20	.20
35	.50	**.58**	.11	.24	.31

(table continues)

CDMSES Item #	Communality Estimates[a]	Factor Coefficients I	II	III	IV
36	.52	**.59**	.30	.05	.27
37	.53	**.64**	.21	.25	.10
38*	.62	.55	.53	.07	.20
39*	.50	.33	.22	.42	.41
40*	.52	.35	.23	.40	.43
41*	.52	.49	.33	.19	.36
42	.55	**.63**	.33	.20	.01
43	.44	**.59**	.25	.03	.17
44	.57	**.59**	.33	.33	.01
45	.35	.28	-.04	.23	**.46**
46	.43	**.51**	.28	-.02	.29
47	.57	**.62**	.20	.31	.23
48	.34	.32	.22	.28	**.33**
49*	.46	.41	.34	.38	.18
50*	.27	.14	.07	.35	.36
Variance Explained[b]		13.98%	13.90%	10.06%	7.72%
Total Variance Explained[c] 45.66%					

Bold Type indicates item/factor location.

* Indicates loadings that did not meet criteria for item retention on factor.

a. Sum of squared loadings for this four-factor solution.

b. Percentage of variance explained by each factor.

c. Percentage of total variance explained by the four factor solution

decision in the future. Factor I accounted for 13.98% of the variance in the data. Factor II, labeled Self-Determinism, accounted for 13.90% of the total item variance. Items loading on this factor represent confidence in the students' abilities to assess, plan, and carry out career decisions determined to be important for self-fulfillment and happiness. The third factor, Information Gathering, deals with students confidence in their ability to research various aspects of their vocational goals in order to successfully pursue their career decision. This factor accounted for 10.06 of the total variance in the data for this solution. The items loading on Factor IV, Major Choice, deal with aspects of the selection of the academic discipline. Factor IV accounted for 7.72% of the variance in the data for the four-factor solution.

The factor structure coefficients for this four-factor solution ranged from .34 to .67 with eighteen items demonstrating loadings insufficient for retention or multi-factor loadings. The total variance explained in the data for this solution was 45.66%. Table G.1 in Appendix G lists each item defining each of the four factors and provides an item location index for the factored subscales of the Career Decision-Making Self-Efficacy Scale.

Intercorrelations among the four CDMSES subscales were positive in direction and relatively strong in magnitude. These correlations were as follows: Future Orientation and Self-Determinism, $r = .70$ ($p \leq .001$); Future Orientation and Information Gathering, $r = .59$ ($p \leq .001$); Future Orientation and Major Choice, $r = .64$ ($p \leq .001$); Self-Determinism and Information Gathering, $r = .57$ ($p \leq .001$), Self-Determinism and Major Choice, $r = .58$ ($p \leq .001$); Information Gathering and Major Choice, $r = .55$ ($p \leq .001$).

Student Academic Major Self-Efficacy Motivation Factor Analyses

An exploratory factor analysis was also completed for the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS). This analysis resulted in a one-factor solution for the three item measure. Item one loaded at .87 and item two loaded at .88. The third item did not meet the established criteria for retention. The total variance explained in the data for this solution was 76.5%. The two items retained in the one-factor solution of the Student Academic Major Self-Efficacy Motivation Scale were subsequently utilized in analyses pertinent to answering the research hypotheses and questions.

Opinionnaire III Factor Analyses

Items comprising the Student Academic Self-Appraisal Inventory (SASI) were mixed with 5 items included as an empirical check on Social Desirability. An exploratory factor analysis was conducted on the items of Opinionnaire III in order to confirm that the social desirability items would load as a single factor apart from the Student Academic Self-Appraisal Inventory items. Table 2 (Appendix F) summarizes the results of this factor analysis and provides information regarding the coefficients obtained for each item. Factor analysis procedures were also performed on the two scales as separate measures. The results of exploratory factor analysis for the Social Desirability Scale was a one-factor solution for the five-item instrument. Table F.3 in Appendix F provides a summary. Item/factor loadings were rather diverse and ranged from a low of -.43 to a high of .71. The total variance explained in the data for this solution was 51.07%.

Student Academic Self-Appraisal Factor Analyses

An exploratory factor analysis was completed for the Student Academic Self-Appraisal Inventory (SASI). The result was a one-factor solution for the five-item instrument. Table 4.3 provides a summary of a one factor, principal components solution for the Student Academic Self-Appraisal Scale. Item/factor loadings were rather robust and ranged from a low of .67 to a high of .77. The total variance explained in the data for this solution is 51.07%. The one-factor solution shown in Table 4.3 was used in all subsequent analyses.

Locus of Control Factor Analyses

As was done with the Career Decision Making Self-Efficacy Scale, an exploratory principal components analysis was completed for the 23 items on the Rotter Internal verses External Control of Reinforcement scale to test the dimensionality of the locus of control construct. An unconstrained solution was first computed, followed by solutions systematically extracting from one to seven factors. These procedures were completed for the entire sample (n=853). Table 4.4 provides a summary of the one-factor, principal components solution for the Internal versus External Control of Reinforcement Scale (I-ECRS). Factor loadings for retained items ranged from a low of .36 to a high of .57. Eight items failed to demonstrate loadings meeting the minimum criteria for retention in the one-factor solution. A rather small percentage of the variance in the data was explained by the one-factor solution (14.95%). Therefore, multiple factor analyses were subsequently completed extracting from one to seven factors on the Internal Versus External Locus of Control Scale.

Table 4.3

Summary of the One-Factor Solution for the Student Academic Self-Appraisal Inventory (SASI) (n=853)

SASI Item #	Communality Estimates	Factor Coefficient
1	.59	.77
2	.50	.71
3	.52	.72
4	.50	.71
5	.45	.67

Table 4.4

Summary of Factor Structure Coefficients and Communalities for Items Retained in the One-Factor Solution for the Internal verses External Control of Reinforcement Scale (I-ECRS) (n = 853)

I-ELOC Item #	Communality Estimates	Factor Coefficient
1	.10	.31
2	.05	.22
3	.08	.28
4	.15	**.39**
5	.12	**.34**
6	.03	.16
7	.08	.29
8	.18	**.42**
9	.25	**.50**
10	.23	**.48**
11	.14	**.37**
12	.21	**.46**
13	.15	**.39**
14	.32	**.57**
15	.30	**.55**
16	.03	.17

(table continues)

I-ELOC Item Estimates	Communality	1 Factor Coefficient
17	.03	.16
18	.18	**.42**
19	.16	**.40**
20	.31	**.56**
21	.04	.21
22	.17	**.41**
23	.13	**.36**

Variance Explained[a] = 14.95%

Bold type indicates item loadings which meet criteria established for item retention
a. Percentage of total item variance explained by the one-factor solution

The results of the four-factor, orthogonal solution (Table 3, Appendix F) were initially determined to be the most acceptable multiple factor representation of the locus of control data when compared with findings of the previous factor analysis of the I-ECRS. However, review of the reliability coefficients on the four-factor solution of the data suggested that a multiple factor solution was not viable. Alpha reliability coefficients for the subscales of the four-factor solution follow: Factor I, r = .50; Factor II, r = .57, Factor III, r = .27, Factor IV, r = -.03. Therefore, the one factor solution shown in Table 4.4 was retained for subsequent analyses pertinent to the research hypotheses and questions. This solution retained 15 of 23 locus of control items.

Academic Major Decision Certainty Factor Analyses

An exploratory factor analysis was also completed for the sixteen items of the Academic Major Decision Certainty Scale (AMDCS) to explore the dimensionality of the decision certainty construct. An unconstrained solution was first computed followed by solutions systematically extracting from one to six factors. These procedures were completed for the entire sample (n=853). Table 4 of Appendix F provides a summary of the one-factor, principal components solution for the Academic Major Decision Certainty Scale (AMDCS). Factor loadings for items retained in this solution ranged from a low of .56 to a high of .76. Fifteen of sixteen items demonstrated loadings meeting the minimum criteria for retention in the one-factor solution. A somewhat modest proportion of variance in the data was explained by this solution (36.18%).

A three-factor, orthogonal solution was determined to be the most acceptable multiple factor representation of the data. Results for this solution are shown in Table

4.5. A total of fifteen items loaded on the three-factor orthogonal solution; eight on Factor I, four on Factor II, and three on Factor III. Factor I, identified as Contentment, was comprised of items pertaining to students' contentment with the major decision. Factor I accounted for 25.17% of the variance in the data for the three-factor solution. Factor II was labeled Commitment and accounted for 15.83% of the variance in the data for the solution. Items loading on this factor represent students' personal commitment to the academic major decision. The items loading on Factor III, Certainty, deal with any uncertainty students' may have regarding the academic major decision. Factor III accounted for 12.17% of the variance in the data for the three-factor solution.

The factor structure coefficients for this three-factor solution ranged from .43 to .76 with only one item having a loading insufficient for retention. The total variance explained by the data for this solution was 53.17%. Table G.1 in Appendix G lists each item defining each of the three factors and provides an item location index for the factored subscales of the Academic Major Decision Certainty Scale (AMDCS). Intercorrelations among these factored subscales were positive in direction and somewhat modest to rather strong in magnitude. These correlations were as follows: Contentment and Commitment, $r = .72$ ($p \leq .001$); Contentment and Certainty, $r = .32$ ($p \leq .001$); Commitment and Certainty, $r = .23$ ($p \leq .001$).

Summary of Factor Analyses

Table 4.6 summarizes the results of the factor analyses completed on the study variables and includes the number of factors, the number of items retained, the range in item/factor loadings, and the total variance explained by the data for the solution

Table 4.5

Summary of Communality Estimates and Item/Factor Loadings for the Three-Factor Orthogonal Solution for the Academic Major Decision Certainty Scale (AMDCS) (n=853)

AMDCS Item	Communality Estimates[a]	Factor Structure Coefficients I	II	III
1*	.53	.53	-.01	.50
2	.61	**.71**	.16	.27
3	.59	.12	.20	**.73**
4	.28	**.43**	.30	.10
5	.59	.19	**.74**	.12
6	.39	**.54**	.26	.17
7	.58	.15	**.74**	.10
8	.54	**.67**	.29	-.04
9	.55	.30	**.67**	.07
10	.53	.15	.08	**.71**
11	.46	.02	.01	**.68**
12	.43	.29	**.59**	.03
13	.59	**.63**	.43	.09
14	.59	**.70**	.30	-.03
15	.64	**.76**	.13	.19
16	.61	**.75**	.20	.11

(table continues)

Variance Explained[b]	25.17%	15.83%	12.17%
Total Variance Explained[c] 53.17%			

Bold Type indicates item/factor location
*Item loadings do not meet criteria for item retention on factor
a. Sum of squared loadings for this three-factor solution
b. Percentage of item variance explained by each factor
c. Percentage of total item variance explained by the four-factor solution

Table 4.6

General Summary of Results of Factor Analyses Completed on the Study Measures. (n=853)

Measure	Number of Factors	Items Retained[a]	Range in Item/ Factor Loadings	Total Variance Explained
CDMSES[a]	4	32/50	.34-.67	45.66%
SAMSEMS	1	2/3	.87-.89	76.50%
SASI	1	5/5	.67-.77	51.07%
I-ECRS	1	15/23	.36-.57	14.95%
AMDCS[a]	3	15/16	.43-.76	53.17%

a. Items retained for each factor for these measures are shown in Appendix G

utilized in the study. The factor analyses of the measures for the constructs resulted in quite different results. While a multiple factor orthogonal solution was deemed to be the most representative solution for both the Career Decision Making Self Efficacy and the Academic Major Decision Certainty scales, a four-factor solution was more suitable for the prior and a three-factor solution for the latter. The strength of the factor loadings for the Academic Decision Certainty Scale (AMDCS) were considerably higher than those for the Career Decision Making Self-Efficacy Scale (CDMSES). The total variance explained for both decision certainty and for career decision making self-efficacy were both relatively high at 53.17% and 45.66% respectively. Intecorrelations between the subscales were much higher for the Career Decision-Making Self-Efficacy Scale than for the Academic Major Decision Certainty Scale.

One-factor principal components solutions were deemed most suitable for the academic major self-efficacy, self-appraisal, and locus of control constructs. The total variance explained by the one-factor solution for the three constructs varied considerably (Student Academic Major Self-Efficacy Measurement, 76.5%; Student Self-Appraisal Scale, 51.07%; and Locus of Control, 14.95%). Items defining each factor of the CDMSES and AMDCS measures can be found in Appendix G. Items defining the other measures in Table 4.6 are included in Appendix C.

Summary of Descriptive Statistics for Factored Subscales of All Measures

For ease of interpretation and comparing scores across the various variables/measures, descriptive statistics for grand means and standard deviations for each factored subscale of the study measures were completed. Results are reported in

Table 4.7. The column headings in this table for each variable/measure include the maximum score (max score), the mean ($\bar{X}$), the standard deviation (S.D.), and the mean percentage maximum possible ($\bar{X}$ % max. poss.).

Of importance is the last column which shows the mean expressed as a percentage of the maximum possible subscale scores which ranged from a low of 38.25% on the I-ECRS to a high of 88.36% on the AMDCS.

Summary of Results of Reliability Analyses

Cronbach Alpha internal consistency reliability coefficients were computed for the subscales of the Career Decision-Making Self-Efficacy Scale and Academic Major Decision Certainty Scales identified through the various factor analyses. Table 4.8 contains a summary of these coefficients. Cronbach Alpha internal consistency reliability coefficients were also computed on the retained items from the one-factor solution of the Student Academic Major Self-Efficacy Measurement, the Student Self-Appraisal Scale, and the Internal-External Locus of Reinforcement Scale. Alpha coefficients were also computed for the one-factor solutions of the career decision-making self-efficacy and academic major decision certainty measures. Table 4.8 and table 4.9 summarize the results of these reliability analyses.

Career Decision Making Self-Efficacy Reliability Analyses

Alpha coefficients were computed for the four factored subscales and for all the 15 items retained in the one-factor solution of the Career Decision Making Self-Efficacy Scale as a global (uni-dimensional) construct. The resulting coefficients were all very high, especially for the global construct (Alpha = .96). Of the four subscales, the

Table 4.7

Summary of Grand Means and Standard Deviations for Each Factored Subscale of the Study Measures (n=853)

Variable/Subscale	Max Score[b]	$\overline{X}$	S.D.	$\overline{X}$ % Max Poss[c]
CDMSES (50)[a]	250.00	197.29	28.97	78.92
CDMSES- Future Orientation (10)	50.00	42.20	6.37	84.40
CDMSES- Self-Determinism (9)	45.00	35.62	6.11	79.15
CDMSES- Information Gathering (6)	30.00	21.35	4.73	71.15
CDMSES- Major Choice (7)	35.00	26.66	4.62	76.19
SAMSEMS (2)	8.00	6.84	1.20	85.55
SASI (5)	20.00	15.71	2.76	78.57
I-ECRS (15)	15.00	5.74	3.11	38.25
AMDCS (15)	60.00	49.48	6.52	88.36
AMDCS- Contentment (8)	32.00	26.75	4.01	83.04
AMDCS- Commitment (4)	16.00	13.68	1.93	85.50
AMDCS- Certainty (3)	12.00	8.59	1.87	71.59

a. Number of items on the variable/subscale
b. Maximum possible score for the variable/subscale
c. Percentage maximum possible for the mean is derived by dividing the mean socre by the maximum possible score

Table 4.8

Summary of Standardized Cronbach Alpha Reliability Coefficients for Factored Subscales of the Career Decision Making Self Efficacy (CDMSES) and Academic Major Decision Certainty Measures (AMDCS) (n=853)

Instrument/Subscale	Alpha Coefficient
Career Decision Making Self Efficacy (32)[a]	
Subscales	
Future Orientation (10)[b]	.88
Self-Determinism (9)	.87
Information Gathering (6)	.79
Major Choice (7)	.70
Academic Major Decision Certainty (15)	
Subscales	
Contentment (8)	.86
Commitment (4)	.73
Certainty (3)	.60

[a] Total number of items for the factor-analyzed version of this instrument.
[b] Number of items on the subscale.

Table 4.9

Summary of Standardized Cronbach Alpha Reliability Coefficients for One Factor Solutions for the Various Measures (n=853)

Instrument	Alpha Coefficient
Career Decision Making Self Efficacy Scale (CDMSES) (50)[a]	.96
Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) (2)	.69
Student Academic Self-Appraisal Inventory (SASI) (5)	.76
Internal Verses External Control of Reinforcement Scale (I-ECRS) (15)	.73
Academic Major Decision Certainty Scale (AMDCS) (15)	.86

[a] Total number of items retained on the one-factor solution of the measure.

highest coefficient was for Future Orientation (Alpha = .88) and the lowest was with Information Gathering (Alpha = .70). For Self-Determinism the Alpha coefficient was .87 and for Major Choice the Alpha coefficient was .79. (See Tables 4.8 and 4.9).

Academic Major Decision Certainty Reliability Analyses

Alpha coefficients were also computed for the three subscales identified in the three-factor solution and for the fifteen items retained in the one-factor solution of the Academic Major Decision Certainty Scale as global (uni-dimensional) constructs. The results were higher for the global construct with an Alpha coefficient of .86 and for the Contentment subscale with an Alpha coefficient of .86 than for those computed for the other two subscales. The Commitment subscale demonstrated higher coefficients at .73 than did the Uncertainty subscale with an Alpha coefficient of .60. This information is also shown in Tables 4.8 and 4.9.

Rationale for Final Structure of Measures

Prior to completing analyses pertinent to the primary research hypotheses and the secondary research questions, certain decisions were made regarding the structure of the measures used in the analyses. First, it was determined that career decision making self-efficacy would be represented by two measures, one global (uni-dimensional) measure of the combined 50 items of the Career Decision Making Self-Efficacy Scale as determined by the one-factor principal components solution, and one measure for the four factors identified in the four-factor orthogonal solution. This solution provided four clear subscales for the construct, all of which exhibited high internal consistency reliability coefficients.

The second decision was to utilize the three-factors identified in the three-factor orthogonal solution for the Academic Major Decision Certainty Scale. This solution generated three clearly defined subscales for the construct, all of which exhibited reasonably high internal consistency reliability coefficients. In addition, the decision was made to use items retained in the one-factor principal components solution of the Academic Major Decision Certainty Scale as a measure of the global (uni-dimensional) construct of academic decision certainty.

Finally decisions were made to use student academic major self-efficacy, student academic self-appraisal, and student internal versus external locus of control of reinforcement as global (uni-dimensional) constructs in the study. Therefore, items retained by the one factor principal components solution on the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS), the Student Academic Self-Appraisal Inventory (SASI), and the Internal-External Control of Reinforcement Scale (I-ECRS) were used to operationalize these global (uni-dimensional) constructs.

Summary of Analyses for Primary Research Hypotheses

The three primary research hypotheses of the study all posited a statistically significant relationship ($p<.001$; one-tailed tests) between the independent and dependent variables of the study. All three hypotheses predicted statistically significant, positive correlations between the locus of control, self-efficacy, and self-appraisal measures and the dependent variable of decision certainty. Bivariate correlation analyses were completed between the independent and dependent variables utilized in the study.

Bivariate Correlation Analyses

To address Hypotheses 1-3, Pearson product moment correlation analyses were completed between the study variables as global (uni-dimensional) constructs. These correlations are shown in table 4.10. Correlation analyses were also completed using subscales of the measures determined by the factor analysis procedures. These correlation coefficients are shown in tables 4.11-4.18. In addressing Hypotheses 1-3, reference is made to these tables. The correlation analyses completed using the social desirability measure are shown in Table 4.18.

Research Hypothesis 1a: There is a statistically significant, positive relationship between the strength of college students' levels of self-efficacy beliefs about their abilities to make academic major decisions and their level of decision certainty in major choice. To address this hypothesis, Pearson product moment correlation analyses were completed using individual student responses as the units of analysis. Table 4.10 shows intercorrelations among uni-dimensional factor structures computed for the various study measures. All correlations in the table are statistically significant ($p<.001$).

Of particular interest relative to the first research hypothesis is the correlation between the Career Decision Making Self-Efficacy Scale (CDMSES) and the Academic Major Decision Certainty Scale (AMDCS). This correlation was positive in direction but rather weak in magnitude ($r=.12$, $p<.0001$). From the perspective of measuring the career decision making and academic major decision certainty variables from a global construct perspective, these results provide only modest support for the first research hypothesis.

Table 4.10

Summary of Intercorrelations of Study Variables with One Another (n=853)

Variable	CDMSES r	SAMSEM r	SASI r	LOCRS r	AMDCS r
CDMSES	---	13*	.14*	-.17*	.12*
SAMSEMS		---	.41*	-.16*	.28*
SASI			---	-.11**	.15*
I-ECRS				---	-.16*
AMDCS					---

* $p \leq .0001$
** $p \leq .001$

Table 4.11

Summary of Intercorrelations of Career Decision Making Self-Efficacy- Future Orientation Subscale with Other Study Variables/Subscales (n=853)

Instrument/Measure	r
CDMSES	.43*
CDMSES- Self-Determinism Subscale	.70*
CDMSES- Information Gathering Subscale	.59*
CDMSES- Major Choice Subscale	.64*
SAMSEMS	.31*
SASI	.27*
I-ECRS	-.19*
AMDCS	.38*
AMDCS- Contentment Subscale	.43*
AMDCS- Commitment Subscale	.35*
AMDCS- Certainty Subscale	.29*

* $p \leq .0001$

Table 4.12

Summary of Intercorrelations of Career Decision Making Self-Efficacy- Self-Determinism Subscale with Other Study Variables/Subscales (n=853)

Instrument/Measure	r
CDMSES	.43*
CDMSES- Future Orientation Subscale	.70*
CDMSES- Information Gathering Subscale	.57*
CDMSES- Major Choice Subscale	.58*
SAMSEMS	.29*
SASI	.25*
I-ECRS	-.15*
AMDCS	.46*
AMDCS- Contentment Subscale	.47*
AMDCS- Commitment Subscale	.32*
AMDCS- Certainty Subscale	.29*

* $p \leq .0001$

Table 4.13

Summary of Intercorrelations of Career Decision Making Self-Efficacy- Information Gathering Subscale with Other Study Variables/Subscales (n=853)

Instrument/Measure	r
CDMSES	.44*
CDMSES- Future Orientation Subscale	.59*
CDMSES- Self-Determinism Subscale	.57*
CDMSES- Major Choice Subscale	.55*
SAMSEMS	.23*
SASI	.24*
I-ECRS	-.15*
AMDCS	.24*
AMDCS- Contentment Subscale	.28*
AMDCS- Commitment Subscale	.23*
AMDCS- Certainty Subscale	.14*

* $p \leq .0001$

Table 4.14

Summary of Intercorrelations of Career Decision Making Self-Efficacy- Major Choice Subscale with Other Study Variables/Subscales (n=853)

Variable/Subscale	r
CDMSES	.56*
CDMSES- Future Orientation Subscale	.64*
CDMSES- Self-Determinism Subscale	.58*
CDMSES- Information Gathering Subscale	.55*
SAMSEMS	.23*
SASI	.16*
I-ECRS	-.19*
AMDCS	.28*
AMDCS- Contentment Subscale	.32*
AMDCS- Commitment Subscale	.24*
AMDCS- Certainty Subscale	.28*

* $p \leq .0001$

Table 4.15

Summary of Intercorrelations of Academic Major Decision Certainty- Contentment Subscale with Other Study Variables/Subscales (n=853)

Variable/Subscale	r
CDMSES	.22*
CDMSES- Future Orientation Subscale	.43*
CDMSES- Self-Determinism Subscale	.47*
CDMSES- Information Gathering Subscale	.28*
CDMSES- Major Choice Subscale	.32*
SAMSEMS	.28*
SASI	.31*
I-ECRS	-.18*
AMDCS	.72*
AMDCS- Commitment Subscale	.61*
AMDCS- Certainty Subscale	.32*

* $p \leq .0001$

Table 4.16

Summary of Intercorrelations of Academic Major Decision Certainty- Commitment Subscale with Other Study Variables/Subscales (n=853)

Variable/Subscale	r
CDMSES	.16*
CDMSES- Future Orientation Subscale	.35*
CDMSES- Self-Determinism Subscale	.32*
CDMSES- Information Gathering Subscale	.23*
CDMSES- Major Choice Subscale	.24*
SAMSEMS	.33*
SASI	.37*
I-ECRS	-.19*
AMDCS	.55*
AMDCS- Contentment Subscale	.61*
AMDCS- Certainty Subscale	.23*

* $p \leq .0001$

Table 4.17

Summary of Intercorrelations of Academic Major Decision Certainty- Certainty Subscale with Other Study Variables/Subscales (n=853)

Variable/Subscale	r
CDMSES	.11**
CDMSES- Future Orientation Subscale	.29*
CDMSES- Self-Determinism Subscale	.30*
CDMSES- Information Gathering Subscale	.14*
CDMSES- Major Choice Subscale	.28*
SAMSEMS	.16*
SASI	----
I-ECRS	-.22*
AMDCS	.61*
AMDCS- Contentment Subscale	.32*
AMDCS- Commitment Subscale	.23*

* $p \leq .0001$
** $p \leq .001$
----- not significant

Table 4.18

Summary of Intercorrelations of Social Desirability Scale with Study Variables/Subscales (n=853)

Variable/Subscale	r
CDMSES	.12*
CDMSES- Future Orientation Subscale	.16*
CDMSES- Self-Determinism Subscale	.16*
CDMSES- Information Gathering Subscale	.15*
CDMSES- Major Choice Subscale	.15*
SAMSEMS	.13*
SASI	.36*
I-ECRS	-.18*
AMDCS	.11**
AMDCS- Contentment Subscale	.21*
AMDCS- Commitment Subscale	.21*
AMDC- Certainty	----

* $p \leq .0001$
** $p \leq .001$
----- not significant

Intercorrelations were also computed between factored subscales of the AMDCS, the uni-dimensional AMDCS and the four factored subscales of the CDMSES. These correlations are shown in Tables 4.11 - 4.14. Of interest in each of these tables is the values for the last four coefficients. Table 4.11 shows correlations between the AMDCS uni-dimensional measure, the three AMDCS factored subscales (Contentment, Commitment, Certainty), and the CDMSES- Future Orientation subscale. The AMDCS subscale/CDMSES- Future Orientation subscale correlations ranged from .29 (AMDCS-Certainty with CDMSES- Future Orientation) to .43 (AMDCS- Contentment with CDMSES- Future Orientation). The correlation between the global (uni-dimensional) AMDCS measure and the CDMSES- Future Orientation subscale was .38. All correlations in table 4.11 are statistically significant ($p<.0001$).

Table 4.12 shows correlations of the AMDCS uni-dimensional measure and the three AMDCS factored subscales with the CDMSES- Self Determinism subscale. These correlations ranged from .29 to .47. The correlation between the global (uni-dimensional) AMDCS measure and the CDMSES- Self Determinism subscale was .46.

Table 4.13 shows correlations of the AMDCS uni-dimensional measures, the three AMDCS factored subscales with the CDMSES- Information Gathering subscale. These correlations ranged from .14 to .28. The correlation between the global (uni-dimensional) AMDCS measure and the CDMSES- Information Gathering subscale was .24)

Table 4.14 shows correlations of the AMDCS uni-dimensional measure and the three AMDCS subscales with the CDMSES- Major Choice subscale. These correlations

ranged from .24 to .32. The correlation between the global (uni-dimensional) AMDCS measure and the CDMSES- Major Choice subscale was .28

All of the global measure and subscale intercorrelations between the AMDCS and the CDMSES measures shown in Tables 4.11 - 4.14 were positive in direction, ranged from rather low (.12) to moderately strong in magnitude (.47), and were highly statistically significant ($p<.001$ or $p< .0001$). Of the 13 correlations between the AMDCS and the CDMSES, ten exceeded .25 and 6 exceeded .30 in magnitude. Considered collectively, the correlation results shown in Tables 4.11 to 4.14 provide rather strong support for the Hypothesis 1a.

Research Hypothesis 1b: There is a statistically significant, positive relationship between college students' levels of self-efficacy motivation for making academic major decisions and their level of decision certainty in the major choice.

This hypothesis was examined in a manner similar to Hypothesis 1a. Pearson product moment correlation analyses were completed using individual student responses as the units of analyses. Table 4.10 shows intercorrelations among uni-dimensional factor structures computed for the various measures. Of particular interest, is the correlation between the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) and the Academic Major Decision Certainty Scale (AMDCS). This correlation was positive in direction and moderate in magnitude ($r = .28$, $p<.0001$). From the perspective of measuring the academic major self-efficacy motivation and academic major decision certainty variable from a global (uni-dimensional) construct prospective, these results provide somewhat moderate support for the hypothesis.

Intercorrelations were also computed between the unidimensional SAMSEMS and the three factored subscales of the AMDCS. These correlations are shown in Tables 4.15 - 4.17. Of interest in each of these tables is the value for the SAMSEMS coefficient. Table 4.15 shows the correlations of the AMDCS- Contentment subscale with the other study variables and subscales. The correlation between the AMDCS-Contentment subscale and the global (uni-dimensional) SAMSEMS was .28. Table 4.16 shows the correlations of the AMDCS- Commitment subscale with the other study variables and subscales. The correlation between the AMDCS- Commitment subscale and the global (uni-dimensional) SAMSEMS was .33. Table 4.17 shows the correlations of the AMDCS- Certainty subscale with the other study variables and subscales. The correlation between the AMDCS- Certainty subscale and the global (uni-dimensional) SAMSEMS was .16.

All of the global measure and subscale intercorrelations between the AMDCS and the SAMSEMS measures shown in Tables 4.15 - 4.17 were positive in direction, ranged from low (.16) to moderate (.33) in magnitude, and were highly statistically significant ($p<.001$ or $p<.0001$). Of the four correlations between the AMDCS and the SAMSEMS, three exceeded .25 and one exceeded.30 in magnitude. Considered collectively, the correlation results shown in Tables 4.15 – 4.17 provide rather strong support for the Hypothesis 1b.

Research Hypothesis 2: There is a statistically significant, positive relationship between the strength of college students' appraisal and their degree of decision certainty in the selection of an academic major.

To address this hypothesis. Pearson product moment correlation analyses were completed using individual student responses as the units of analysis. Table 4.10 shows intercorrelations among uni-dimensional factor structures computed for the various measures. Of particular interest relative to this hypothesis is the correlation between the Student Academic Self-Appraisal Inventory (SASI) and the Academic Major Decision Certainty Scale (AMDCS). This correlation was positive in direction and rather low in magnitude ($r = .15$, $p<.0001$). From the perspective of measuring the academic self-appraisal and academic major decision certainty variables from a global (uni-dimensional) construct prospective, these results provide quite modest support for the hypothesis.

Intercorrelations were also computed between the unidimensional SASI and the three factored subscales of the AMDCS. These correlations are shown in Tables 4.15 - 4.17. Of interest in each of these tables is the value for the SASI coefficient. Table 4.14 shows the correlations of the AMDCS- Contentment subscale with the other study variables and subscales. The correlation between the AMDCS- Contentment subscale and the global (uni-dimensional) SASI was .31. Table 4.16 shows the correlations of the AMDCS- Commitment subscale with the other study variables and subscales. The correlation between the AMDCS- Commitment subscale and the global (uni-dimensional) SASI was .37. Table 4.17 shows the correlations of the AMDCS- Certainty subscale with the other study variables and subscales. The result of the Pearson correlation analysis between the AMDCS- Certainty subscale and the global (uni-dimensional) SASI was not significant.

Three of the four global measure and subscale intercorrelations between the AMDCS and the SASI measures shown in Tables 4.15 - 4.17 were positive in direction, low (.16) to and moderate (.37) in magnitude, and were highly statistically significant ($p<.001$ or $p<.0001$). Of the four correlations between the AMDCS and the SAMSEMS, two exceeded .30 in magnitude. Considered collectively, the correlation results shown in Tables 4.15 – 4.17 provide moderate support for the second research hypothesis with the exception of the relationship between the SASI and the AMDCS-Certainty Subscale which was not significant.

Research Hypothesis 3: There is a statistically significant, positive relationship between the degree of college students' internal locus of control and the degree of decision certainty in the selection of an academic major.

To address this hypothesis, Pearson product moment correlation analyses were completed using individual student responses as the units of analysis. Table 4.10 shows intercorrelations among uni-dimensional factor structures computed for the various measures. Relative to this hypothesis is the correlation between the Internal-External Contol of Reinforcement Scale (I-ECRS) and the Academic Major Decision Certainty Scale (AMDCS). This correlation was negative in direction and somewhat weak in magnitude ($r = -.16$, $p<.0001$). From the perspective of measuring the locus of control of reinforcement and academic major decision certainty variables from a global construct prospective, these results provide only modest support for the Hypothesis 3.

Intercorrelations were also computed between the uni-dimensional I-ECRS and the three factored subscales of the AMDCS. These correlations are shown in Tables

4.15 - 4.17. Of interest in each of these tables is the value for the I-ECRS coefficient. Table 4.15 shows the correlations of the AMDCS- Contentment subscale with the other study variables and subscales. The correlation between the AMDCS- Contentment subscale and the global (uni-dimensional) I-ECRS was -.18. Table 4.16 shows the correlations of the AMDCS- Commitment subscale with the other study variables and subscales. The correlation between the AMDCS- Commitment subscale and the global (uni-dimensional) I-ECRS was -.19. Table 4.17 shows the correlations of the AMDCS- Certainty subscale with the other variables and subscales. The correlation between the AMDCS- Certainty subscale and the global (uni-dimensional) I-ECRS was -.22.

All of the global measure and subscale intercorrelations between the AMDCS and the I-ECRS measures shown in Tables 4.15 - 4.17 were negative in direction, somewhat low (-.16 to -.22) in magnitude, and were highly statistically significant ($p<.0001$). Of the four correlations between the AMDCS and the I-ECRS, none exceeded .25 in magnitude. Since the items on the Internal-External Locus of Control Scale are scored in the external direction (the higher the score the greater the externality of the participants), these results indicated a negative relationship between an external orientation and academic major decision certainty. Considered collectively, the correlation results shown in Tables 4.15 – 4.17 provide rather modest support for Hypothesis 3.

Summary of Analyses for Supplemental Research Questions

In addition to the examination of the primary research hypotheses, data analyses were also completed to address the four supplemental research questions identified in

Chapter 1. In order to answer these questions, bivariate and multiple correlation analyses were computed. These results are presented below for each research question.

Research Question 1: How much of the variation in decision certainty among students is accounted for by the combination of locus of control, self-efficacy, and the self-appraisal process variables?

Regression Analyses

Step-wise regression analyses were used to determine the degree of variation in decision certainty among college students that is accounted for by the combination of the independent variables. For these analyses, Decision Certainty was treated as the criterion variable. Results from these analyses are reported in Tables 4.19- 4.23.

Results reported in Table 4.19 and subsequent regression tables only include independent variable measures accounting for at least one percent of the variation in the decision certainty (dependent) variables. The column headings in the regression tables include for each step in the analysis the variable entered, the multiple correlation (R), the coefficient of determination (R^2), the change in the coefficient of determination (ΔR^2), the F value for the variable entered (F), and the level of statistical significance for the variable entered (p).

Regression analyses were completed regressing the Academic Major Decision Certainty Scale (AMDCS) as a global (uni-dimensional) construct on the four independent variable measures of the Career Decision-Making Self-Efficacy Scale (CDMSES), the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS), the Student Academic Self-Appraisal Inventory (SASI), and the Internal verses External

Table 4.19

Stepwise Regression of the Academic Major Decision Certainty Scale (AMDCS) on Student Academic Major Self-Efficacy (SAMSEMS), Student Academic Self Appraisal (SASI), Locus of Control of Reinforcement (I-ECRS), and Career Decision Making Self-Efficacy (CDMSES) Subscales

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	SAMSEMS	.28	.08	---	71.93	.0001
2	I-ECRS	.30	.09	.01	12.34	.0005

Control of Reinforcement Scale (I-ECRS) as global (uni-dimensional) constructs. Results from these analyses are reported in Table 4.19.

In this regression analysis, the Student Academic Major Self-Efficacy Motivation Scale(SAMSEMS) was identified as the first predictor variable (R^2 = .08) followed by Student Academic Self-Appraisal (ΔR^2 = .01). Although the latter variable was statistically significant ($p \leq .0005$), it added little to the magnitude of the multiple correlation.

Subsequently, regression analyses were completed regressing each of the three factored subscales (Contentment, Commitment, Certainty) of the decision certainty construct on the four independent variables of career decision-making self-efficacy, academic major self-efficacy, self-appraisal, and locus of control as global (uni-dimensional) constructs and the four subscales of the CDMSES (Future Orientation, Self-Determinism, Information Gathering, Major Choice). These results follow and are summarized in Tables 4.20 – 4.22.

Table 4.20 displays the results of the regression of the AMDCS- Contentment subscale on the independent variables. In this regression analysis, the Self-Determinism subscale of the Career Decision Making Self-Efficacy Scale (CDMSES) was identified as the first predictor variable (R^2 = .22) followed by Student Academic Self-Appraisal (ΔR^2 = .04) and Locus of Control of Reinforcement (ΔR^2 = .01). Although the latter two variables were statistically significant ($p \leq .0001$), both added little to the magnitude of the multiple correlation. This three variable model accounted for twenty-seven percent of the total variation in the Decision Certainty- Contentment subscale (R^2=.15).

Table 4.20

Stepwise Regression of Academic Major Decision Certainty- Contentment Subscale on Student Academic Major Self-Efficacy, Student Academic Self Appraisal, Locus of Control of Reinforcement, and Career Decision Making Self-Efficacy Subscales

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	CDMSES- Self-Determinism	.47	.22	---	240.18	.0001
2	Student Academic Self Appraisal	.51	.26	.04	44.18	.0001
3	Locus of Control of Reinforcement	.52	.27	.01	14.47	.0002

Table 4.21

Stepwise Regression of Academic Major Decision Certainty- Commitment Subscale on Student Academic Major Self-Efficacy, Student Academic Self Appraisal, Locus of Control of Reinforcement, and Career Decision Making Self-Efficacy Subscales

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	Student Academic Self Appraisal	.37	.14	---	16.80	.0001
2	CDMSES- Future Orientation	.45	.20	.06	66.45	.0001
3	Locus of Control of Reinforcement	.46	.21	.01	11.82	.0006

Table 4.22

Stepwise Regression of Academic Major Decision Certainty- Certainty Subscale on Student Academic Major Self-Efficacy, Student Academic Self Appraisal, Locus of Control of Reinforcement, and Career Decision Making Self-Efficacy Subscales

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	CDMSES- Self Determinism	.30	.09	---	80.87	.0001
2	Locus of Control of Reinforcement	.35	.12	.03	33.92	.0001
3	CDMSES- Information Gathering	.37	.14	.02	12.51	.0004
4	Student Academic Self Appraisal	.38	.15	.01	12.63	.0004

The second regression analyses completed involved the regression of the AMDCS- Commitment Subscale on the independent variable measures of the SAMSES. SASI, and I-ECRS as global (uni-dimensional) constructs and the four subscales of the CDMSES. The results of this analysis are shown in Table 4.21. In this analysis, the Student Academic Self-Appraisal Inventory (SASI) was identified as the first predictor variable ($R^2 = .14$) followed by the Future Orientation subscale of the Career Decision Making Self-Efficacy Scale (CDMSES) ($\Delta R^2 = .06$) and the Internal versus External Control of Reinforcement Scale (I-ECRS) ($\Delta R^2 = .01$). Although the latter two variables are statistically significant ($p \leq .0001$), both added little to the magnitude of the multiple correlation. This three variable model accounted for twenty-one percent of the total variation in the commitment subscale of the AMDCS (R^2=21%).

The third analysis completed regressed the AMDCS- Certainty Subscale on the independent variable measures of the SAMSES, SASI, and I-ECRS as global (uni-dimensional) constructs and the four subscales of the CDMSES. Results of this analysis are shown in Table 4.22. In this regression analysis, the Self-Determinism subscale of the CDMSES was identified as the first predictor variable ($R^2 = .09$) followed by the Internal versus External Control of Reinforcement Scale (I-ECRS) ($\Delta R^2 = .03$), the Information Gathering subscale of the (CDMSES) ($\Delta R^2 = .02$), and the SASI ($\Delta R^2 = .01$. Although the latter three variables were statistically significant ($p \leq .0001$), little was to the magnitude of the multiple correlation. Neither the SAMSEMS measure nor the remaining subscales of the CDMSES measure met the .01 significance level for entry into the model. This four variable model, accounted for only fifteen percent of the

total variation in the Decision Certainty- Certainty subscale (R^2=.15) considered collectively, the results of the regression analyses suggest that the independent variables are important elements of decision certainty.

Research Question 2: What is the relationship between the various independent variables in the study?

To address this research question, Pearson product moment correlation coefficients were computed between the independent variables in the study measured as global (uni-dimensional) constructs: CDMSES, SAMSEMS, SASI, I-ECRS, and the AMDCS. These correlations are shown in table 4.10 (p.134). The correlations ranged from low -.11 (SASI/I-ECRS) to moderate .41 (SASI/SAMSEMS). The SAMSEMS/ CDMSES correlation was .13. The CDMSES/SASI correlation was .14. The CDMSES/I-ECRS was -.17, and the SAMSEMS/ I-ECRS was -.16. All correlations were statistically significant ($p \leq .001$ or $p \leq .0001$). These results show that students' academic self-appraisals are positively, though moderately related to their academic major self-efficacy motivation. Additionally, the results show that students' internal locus of control is related both to career decision-making self-efficacy and academic self-efficacy motivation. Although these relationships are in the predicted direction, they were low in magnitude.

Bivariate correlation analyses were also completed on the subscales of the construct measures identified by the factor analysis procedures. The correlations among the measurement subscales are shown in tables 4.11 - 4.14 (p.135-138). Tables 4.11 – 4.14 also show correlations between the CDMSES subscales and the other global (uni-

dimensional) measures. For example, Table 4.11 includes the correlation between the CDMSES- Future Orientation subscale and the SASI (.27)

Table 4.11 shows correlations between the Future Orientation subscale of the CDMSES and other global (uni-dimensional) measures. The correlations between the CDMSES- Future Orientation subscale and the global variables ranged from -.19 (I-ECRS) to .42 (CDMSES). The correlations between the remaining global measures and the CDMSES- Future Orientation subscale were .31 (SAMSEMS), and .27 (SASI).

Correlations between Future Orientation and the other subscales of the CDMSES measure were higher than for the more global measures shown in Table 4.11. The correlations between these subscales and Future Orientation were .70 (Self-Determinism), .59 (Information Gathering), and .64 (Major Choice).

Table 4.12 shows correlations between the Self-Determinism subscale of the CDMSES and other global (uni-dimensional) measures. The correlations between the CDMSES- Self-Determinism subscale and the global variables ranged from -.15 (I-ECRS) to .43 (CDMSES). The correlations between the remaining global measures and the CDMSES-Self-Determinism subscale were .29 (SAMSEMS), and .25 (SASI).

Correlations between Self-Determinism and the other subscales of the CDMSES measure were higher as shown in Table 4.12. The correlations between these subscales and Self-Determinism were .70 (Future Orientation), .57 (Information Gathering), and .58 (Major Choice).

Table 4.13 shows correlations between the Information Gathering subscale of the CDMSES and other global (uni-dimensional) measures. The correlations between

the CDMSES- Information Gathering subscale and the global variables ranged from -.15 (I-ECRS) to .44 (CDMSES). The correlations between the remaining global measures and the CDMSES- Information Gathering subscale were .23 (SAMSEMS), and .24 (SASI).

Correlations between Information Gathering and the other subscales of the CDMSES measure were higher as shown in Table 4.13. The correlations between these subscales and Information Gathering were .59 (Future Orientation), .57 (Self-Determinism), and .55 (Major Choice).

Table 4.14 shows correlations between the Major Choice subscale of the CDMSES and other global (uni-dimensional) measures. The correlations between the CDMSES- Major Choice subscale and the global variables ranged from -.19 (I-ECRS) to .56 (CDMSES). The correlations between the remaining global measures and the CDMSES- Major Choice subscale were .23 (SAMSEMS), and .16 (SASI).

Correlations between Major Choice and the other subscales of the CDMSES measure were higher as shown in Table 4.14. The correlations between these subscales and Major Choice were .64 (Future Orientation), .58 (Self-Determinism), and .55 (Information Gathering). These results indicate that various independent variables are somewhat related to one another.

Research Question 3: What are the psychometric properties (validity and reliability) of the variables used in the study?

To provide reliability information regarding the stability of the instruments, supplemental data were collected. Students enrolled in a chemistry course held at

Louisiana State University during the academic semester (fall, 1999) immediately following the semester (summer, 1999) utilized for data collection were used to obtain test-retest data (n=119). The data collection and processing methods described in Chapter 3 were followed with this sample as well. The set of measures was administered twice to the same sample of students. A three-week interval occurred between the first and second administration of the measures. One hundred sixty-five students completed the first administration of the test. Of that number, one hundred and nineteen students completed the second administration of the test. The data from this set (n=119) was analyzed separately to examine test-retest reliability. Table 4.23 shows ranges for the means and standard deviations on the measurement scales and subscales utilized in the study for the pre-test and post-test of the supplemental sample (n=119) and the original sample (n=853) used in this study. It is important to note that means are not directly comparable from one measure to another because of different number of items on various scales and because of the differences between maximum possible scores available on the difference measures. Comparisons can be made across rows in Table 4.23

These results show that the means and standard deviations on the measurement scales and subscales from the pre-test administrations for the supplemental sample (n=119) are similar the post-test administration for the supplemental sample. The greatest difference between the mean ranges was reported between the low end of the (3.54) for the CDMSES- Major Choice subscale. Mean and standard deviation ranges reported on the measurement scales and subscales were higher for the post-test

Table 4.23

Summary of Item Mean and Standard Deviation Ranges for All Continuous, Rank and Categorical Measures and Subscales

Instrument/ Subscale	Study Sample n=853 Mean Range	S.D. Range	Supplemental Sample n=119 Pre-Test Mean Range	S.D. Range	Post-Test Mean Range	S.D. Range
CDMSES*	3.07-4.47	.79-1.29	2.85-4.36	.63-1.26	3.30-4.29	.84 -1.23
Future O.	4.00-4.47	.79-1.10	4.00-4.36	.78-1.02	3.96-4.2	.84-1.01
Self-Determ.	3.19-4.23	.86-1.17	3.01-4.24	.83-1.23	3.34-4.23	.88-1.15
Info. Gathering	3.07-3.92	1.02-1.20	2.85-3.87	1.02-1.26	3.30-3.96	.94-1.11
Major Choice	3.50-4.13	1.01-1.29	2.85-4.20	.91-1.19	3.54-4.10	.95-1.16
SAMSEM	3.40-3.45	.69**	3.52-3.59	.58-.65	3.57-3.63	.55-.67
SASI	2.98-3.29	.72-.88	3.01-3.42	.63-.84	3.12-3.37	.71-.81
SD	2.05-3.44	.67-.83	2.29-3.36	.63-.81	2.47-3.39	.69-.82
LOCRS	.18-.75	.38-.50	.18-.82	.39-50	.24-.84	.37-50
AMDCS	2.53-3.53	.62-.87	2.08-3.53	.58-.88	2.29-3.46	.61-.91
Contentment	3.19-3.44	.63-81	2.81-3.33	.62-.81	2.95-3.28	.61-.82
Commitment	3.28-3.53	.62-.71	3.04-3.53	.58-.70	3.24-3.46	.61-.69
Certainty	2.53-3.10	.82-.87	2.06-2.98	.71-.84	2.29-2.97	.74-82

The titles of the first three subscales of the Career Decision Making Self-Efficacy Scale were abbreviated for the purpose of formatting. The subscales are Future Orientation. Self-Determinism, Information Gathering.

*Maximum item rating on the majority of the instruments and subscales is 4, however, the maximum item rating for the CDMSES Scale and subscales is 5.

**Two item instrument, standard deviation in the N=853 sample on both was .69. mean range on the pre-test (2.85) and the low end of the mean range on the post-test

administration than the pre-test administration. The exception to this finding is that the mean range reported for the CDMSES- Future orientation subscale for the pre-test administration (4.00-4.36) was higher than that reported for the post-test administration (3.96-4.29).

Ranges for the means and standard deviations on the measurement scales and subscales utilized in the study for the pre-test and post-test administration of the supplemental sample (n=119) were similar to those of the original sample (n=853) used in this study.

Reliability Analyses

Cronbach Alpha internal consistency reliability coefficients were computed for the scales and subscales of the measures used to operationalize the independent and dependent variables in the study on both the pretest and posttest administrations of the measures to the supplemental student sample (n=119). The results are summarized in Table 4.24. The following reliability coefficients were found for each global measure: CDMSES- pre-test = .96 /post-test = .98; SAMSEM- pre-test = .78/post-test = .75; SASI-pre-test = .72/ post-test = .78; LOCRS- pre-test = .72/post-test = .77; AMDCS- pretest = .69/post-test = .80. Similar results were found for the alpha reliabilities for the factored subscales of the CDMSES and the AMDCS. The only noticeable difference between the two administrations was on the Major Choice subscale of the Career Decision Major Self-Efficacy Scale with Alpha = .72 on the pre-test and Alpha = .82 and on the Uncertainty subscale of the Academic Major Decision Certainty Scale with Alpha = .49 on the pre-test and Alpha = .66 on the post-test.

Table 4.24

Summary of Internal Consistency and Test/Re-Test Reliability Coefficients for the Supplemental Data Set (n=119)

Instrument/ Subscale	Pre-test Alpha	Post-test Alpha	Stability Coefficients
CDMSES	.96	.98	.54
Future Orientation	.89	.93	.54
Self-Determinism	.85	.91	.53
Information Gathering	.78	.82	.60
Major Choice	.72	.82	.54
SAMSEMS	.78	.75	.47
SASI	.72	.78	.61
I-ECRS	.72	.77	.69
AMDCS	.69	.80	.41
Contentment	.83	.87	.58
Commitment	.67	.72	.34
Certainty	.49	.66	.61

Table 4.43 also shows stability coefficients (test-retest reliabilities) for each of the study measures. The coefficients range from .69 (I-ECRS) to .34 (AMDCS-Commitment subscale). Considered collectively, these coefficients were somewhat lower in magnitude than expected given the nature of the measurement constructs and the three-week time interval between the pre-test and post-test administrations.

Research Question 4: Can a conceptually meaningful and statistically robust structural equations model be developed from the data that is consistent with the conceptual framework used to organize the study (Figure 1)?

One of the original intents of this study was to use statistical causal modeling procedures (e.g., LISREL, EQS) to develop a more comprehensive picture of factors related to academic major decision certainty than those currently represented in the extant literature. However, the bivariate correlation coefficients among the independent variables of career decision-making self-efficacy, academic self- efficacy, self-appraisal and locus of control and the decision certainty variables were rather moderate in magnitude. Additional Pearson product correlation coefficients were computed using selected presage variables (age, high school GPA, college GPA, father's education level, mother's education level, declared major) and the independent and dependent variables of the study. Those correlations that were statistically significant ($p<.0001$) were rather moderate to low in magnitude. The intercorrelations ranged from a high of .48 for mother's education level/father's education to a low of -.12 for age and the locus of control measure (I-ECRS). The next highest correlation was reported for high school grade point average to college grade point average ($r = .37$). The remaining correlations

were: declared major/age (r = -.25), declared major/CDMSES-Self-Determinism (r = -.25), high school grade point average/age (r =.23), mother's education level/age (r =-.22), declared major/ CDMSES- Future Orientation (r= -.17), father's education level/age (r= -.16), age/CDMSES- Major Choice (r =.15), declared major/ ADMDCS-Certainty (r =-.14), and mother's education level/AMDCS-contentment (r= -.13).

In addition, the analyses regressing the global (uni-dimensional) construct and three factored subscales of the Academic Major Decision Certainty Scale on the career decision making self-efficacy variable and its four-factored subscales; academic self-efficacy; self-appraisal; and locus of control variables yielded rather small and varied multiple correlation coefficients. When the presage variables discussed above were added to the formulas as independent variables in subsequent regression models, they did not appreciably increase the multiple correlation obtained. The results are summarized in Tables 4.25 –4.27.

These results suggested that subsequent analyses of the data using multivariate procedures (LISREL) would yield little information useful in developing a statistical model to better understand the predicted complex linkages among the study variables.

Causal Comparative Analyses

Causal comparative analyses were completed for selected subgroups in the study. In order to compare those students who had declared a major to those who had not formally declared an academic major on the study variables, t-test analyses were completed on career decision making self-efficacy, student academic major self-efficacy, student academic self-appraisal, locus of control of reinforcement, and

Table 4.25

Stepwise Regression of Academic Major Decision Certainty- Contentment Subscale on Student Academic Major Self-Efficacy, Student Academic Self Appraisal, Locus of Control of Reinforcement, Career Decision Making Self-Efficacy Subscales, and Various Presage Variables

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	CDMSES- Self Determinism	.49	.24	---	232.25	.0001
2	Student Academic Self Appraisal	.53	.28	.03	34.68	.0001
3	CDMSES- Future Orientation	.54	.29	.01	13.24	.0003
4	Mother's Education Level	.55	.30	.008	8.48	.0004

Table 4.26

Stepwise Regression of Academic Major Decision Certainty- Commitment Subscale on Student Academic Major Self-Efficacy, Student Academic Self Appraisal, Locus of Control of Reinforcement, Career Decision Making Self-Efficacy Subscales, and Various Presage Variables

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	Student Academic Self Appraisal	.35	.12	---	102.69	.0001
2	CDMSES- Future Orientation	.43	.18	.06	51.14	.0001
3	CDMSES- Self Determinism	.435	.189	.009	6.56	.0106
4	Age	.44	.194	.005	8.48	.0281
5	College Grade Point Average	.443	.197	.002	2.39	.1243

Table 4.27

Stepwise Regression of Academic Major Decision Certainty- Certainty Subscale on Student Academic Major Self-Efficacy, Student Academic Self Appraisal, Locus of Control of Reinforcement, Career Decision Making Self-Efficacy Subscales, and Various Presage Variables

Step	Variable Entered	R	R^2	ΔR^2	F	p
1	CDMSES- Self Determinism	.32	.10	---	82.88	.0001
2	CDMSES- Future Orientation	.35	.12	.02	11.48	.0007
3	Student Academic Self Appraisal	.36	.13	.01	10.12	.0015
4	Age	.37	.135	.005	5.53	.0190
5	College Grade Point Average	.373	.139	.004	3.14	.0768

academic major decision certainty. The results of these analyses showed no significant differences between the 785 students who attest they had declared a major and the 68 students who reported they had not formally declared a major ($p>.05$). These results further support the conclusion that dichotomous classification of students as decided or undecided is not sufficient for measuring decision certainty. Nor does their classification identify differences between these two groups on any other variables in the study.

In order to compare those students who attested to have changed their major to those who indicated that they had never changed their major, t-test analyses were also completed. Comparisons were made between the two groups on the study variables of career decision making self-efficacy, student academic major self-efficacy motivation, student academic self-appraisal, locus of control of reinforcement, and academic major decision certainty. The results of these analyses showed a significant difference between the 411 students who attested to have changed their major in the past, and the 354 students who indicated they had never changed their major on the Major Choice subscale of the Career Decision Making Self-Efficacy Scale ($t = 2.30$, $p< .05$) and on the Student Academic Self-Appraisal Inventory ($t = 2.49$, $P< .05$). These results suggest that additional study of students who change majors is needed to ascertain difference among these students. These results call into question as well, the more traditional use of a dichotomous classification (decided or undecided) as an operational definition of decision certainty.

A series of one-way ANOVAs was also completed to examine differences between academic classification levels (freshman, sophomore, junior, senior) on each of

the study variables. Of 853 students, 818 indicated their academic classification as requested. Table 4.28 summaries the results of these procedures and includes F values and statistical probabilities for each of the one-way ANOVAs completed. As can be seen in the table, all F values were statistically significant ($p<.05$) given the rather large sample sizes, with the exception of the locus of control measure (I-ECRS).

For each of these significant F tests, post-hoc t-tests (Tukey procedures) were completed to compare group means and variances by academic class level groups. Inspection of these comparisons for each post-hoc analysis suggested that the most meaningful and replicable results comparisons were for freshman and senior classes. Therefore, only the post-hoc results for the freshman and senior classes are reported here.

Table 4.29 includes means and standard deviations and the results of post-hoc comparisons (t and p values) for freshman and senior academic classification groups for each study variable (with the exception of the I-ECRS scale). As can be seen in the table, significant differences between these two classifications were found for all of the study variables with the exception of the locus of control variable. The largest t-test differences were found for the career decision making self-efficacy global (uni-dimensional) variable (12.0). Though statistically significant, rather small mean differences were evident for the SAMSEMS (.6), AMDCS- Commitment (.7), AMDCS- Uncertainty (.7), and SASI (.8). Though statistically significant given the rather large sample sizes, some of the mean differences shown in Table 4.29 should be viewed cautiously relative to their implications for theory and practice.

Table 4.28

Summary of One-Way ANOVAS's on Study Variables Measures Using Class Levels as the Independent Variable

Variable	F	p
CDMSES	6.05	.0005
CDMSES-Future Orientation	3.71	.0115
CDMSES- Self-Determinism	3.62	.0130
CDMSES- Information Gathering	3.64	.0125
CDMSES- Major Choice	6.02	.0005
SAMSEMS	7.92	.0001
SASI	.96	.0315
I-ECRS	.65	.5854
AMDCS	5.94	.0005
AMDCS-Contentment	3.13	.0251
AMDCS- Commitment	4.87	.0023
AMDCS- Certainty	3.84	.0096

Table 4.29

Summary of Post-Hoc t-tests (Tukey) for significant ANOVA's on Study Variables Comparing Freshmen to Seniors

Variable	Class Levels: Senior $\bar{X}$	Senior S.D.	Freshman $\bar{X}$	Freshman S.D.	$\bar{X}$ Diff[a]
CDMSES (250)[b]	201.6	28.9	189.6	27.3	12.0
CDMSES-Future Orientation (50)	42.8	6.3	40.8	6.4	1.9
CDMSES- Self-Determinism (45)	36.3	6.3	34.4	6.0	1.9
CDMSES- Information Gathering (30)	22.0	4.7	20.4	4.5	1.5
CDMSES- Major Choice (35)	27.3	4.5	25.4	4.4	1.9
SAMSEMS (8)	7.1	1.1	6.5	1.4	.6
SASI (20)	16.0	2.7	15.2	2.9	.8
AMDCS (60)	50.7	6.3	47.7	7.2	2.9
AMDCS-Contentment (32)	27.1	3.9	25.8	4.6	1.3
AMDCS- Commitment (16)	13.9	1.8	13.2	2.4	.7
AMDCS- Certainty (12)	8.9	2.0	8.2	2.0	.7

a. Critical value of t set at 3.641 ($p = .05$)

b. Maximum possible score for measure

Note : Mean difference scores (last column) were computed by subtracting the freshman sample from the senior sample mean

Chapter Summary

Chapter 4 describes the results of the data analyses completed in the study. The following analyses and results are described in this chapter: descriptive statistics for the sample; descriptive statistics for the instrument set items, descriptive statistics for the independent and dependent variables; factor analyses procedures for the independent and dependent variables, internal consistency reliabilities for the measures, intercorrelations among the measures and subscales, multiple regression analyses to examine multivariate relationships pertinent to explaining variation in decision certainty, analyses related to the major research hypotheses and supplemental research questions. Descriptive statistics and stability coefficients obtained from the supplemental sample test-retest administration to provide information regarding the stability of the instruments are also described. Chapter V that follows, presents conclusions, a discussion, and implications of the study.

CHAPTER 5: CONCLUSIONS, DISCUSSION, IMPLICATIONS

This chapter begins with a brief overview of the study, restating its significance, purpose, and intended contributions. A summary of the study's major findings and conclusions follows with a discussion of implications of the findings as they relate to theory, future research, and practice. The chapter concludes with a summary of the study.

Overview of the Study

This study was designed to explore relationships between several variables which help explain the decision making process by which college students select a major course of study and the certainty with which this decision is made. Psychological factors were examined for their significance in relation to academic major decision making. Specifically, three psychological constructs, self-efficacy, locus of control and self-appraisal, were studied to determine their significance as mediating variables affecting student's decision certainty in the selection of an academic major once the decision has been made. It was postulated that the three psychological constructs are related to the degree of decision certainty of college students towards the selected academic major.

Decision certainty regarding an academic major, for the purpose of this research, was viewed within the framework of developmental and individual differences that motivate people to engage in the process of decision making. Although no study had yet been conducted to examine the relationship between self-efficacy, self-appraisal, locus of control, and decision certainty in the selection of an academic major, the first three variables had each been closely linked to career decision making and choice.

Figure 1 (p. 17) shows the conceptual framework of the study. The figure depicts student presage variables and demographic characteristics as inputs in the decision making process (e.g., age, gender, ethnicity, grade point average). Linkages between these input variables and degree of decision certainty are mediated by the personal variables of self-efficacy, self-appraisal, and locus of control.

The mediating variables in this study included both static and dynamic processes. Locus of control, for example, is considered a static variable because the extent of an individual's beliefs that personal behavior is caused by internal or external forces crosses is considered to generalize across various tasks and situations. It is a global and constant self-perception consistent with personal traits and states of the individual. On the other hand, self-efficacy and self-appraisal are considered dynamic processes. Both processes are marked by continuous and productive activity and change as sources of information are filtered through current perceptions, knowledge about self, and the individual's interaction with situations and tasks. Levels of self-efficacy are considered to be both task and situation specific. As the model illustrates, self-efficacy, self-appraisal, and locus of control within the decision making process were expected to contribute to decision certainty.

The design of the study was initially prompted by a lack of information about the decision certainty of college students after the selection of an academic major. Extensive research has been conducted about academic major choice, but this research lacks a theoretical framework. Previous research has also been simplistic in nature, focusing on personal characteristics of students and demographic variables, rather than more theory rich variables grounded in the social sciences. Past research has also been

conducted with student subgroups rather than the overall student population i.e., it had not including both undecided and decided students. The extant research on academic major decision has focused predominately on major choice as a dichotomous variable of undecided/decided. Research and theoretical emphasis in the literature concerned with defining academic major choice has also typically focused on undecided students. Little if any research has been conducted on students regarding the issue of major selection once the student has decided on a major. Therefore, the literature in this area lacks any inquiry regarding the degree of certainty that decided students have regarding the academic major choice once it has been made.

The review of the decision making literature and the nature of indecision research in the higher education context established the need for conducting research aimed at understanding the quality of academic major selection methods and decision certainty. The need to move beyond studying college students based upon their undecided status alone was also recognized. In order to impact broader issues such as student matriculation and development, a priority for research on academic major decision-making is to explore the process of academic major selection that results in high levels of decision certainty about the selection once made.

Decision certainty is a new concept created to explain the "quality" of a student's major choice. Conceptually, decision certainty was defined as the current degree of commitment to and contentment with a choice after a decision is made. This distinction differs from the extant literature that discusses major choice as a categorical decision of either decided or undecided. Decidedness alone is not necessarily a good outcome if the decision was reached hastily or for reasons in conflict with the student's

personal characteristics (Betz, 1988). By focusing on decision certainty, the integrity of the decision was thought to be ascertainable within this study's context. For an individual to arrive at academic major decision certainty, it was assumed that realistic consideration of career options and personal characteristics would have to occur. This consideration is thought to lead to increased levels of commitment to and contentment with the expected academic major selected.

Commitment to academic major selection reflects concern for the level of post-decisional stability of the choice illustrated by the degree of dedication an individual exerts in fulfilling that choice once it is made. The concept of commitment is central to most formulations of the decision making process (Janis & Mann, 1977). The dynamics of commitment extend beyond the act of making a decision and include post decisional stability.

Contentment with the academic major selection relates to the degree of satisfaction and freedom from doubt and other negative feelings an individual experiences once the academic major decision has been made. The component of contentment is central to reducing negative consequences, conflict, and discomfort associated with poor quality decision making. The component of contentment as presented is included in both decision making theory (Janis & Mann, 1977; Harren, 1979) and cognitive dissonance theory (Festinger, 1957).

Additional reviews of the decision-making literature revealed another area of inquiry for the study. Though much attention has been given to the role of personal characteristics and processes in the decision making literature, little empirical research has been completed within larger theoretical conceptions as these might relate to

academic and career decision making. More specifically, little attention has been given to the study of psychosocial factors that might contribute to a student's academic major decision-making process and to decision certainty.

The cognitive and affective processes which students undergo when considering an academic major have only recently been explored in the vocational literature. Krumboltz, Mitchell, and Jones (1976) first conceptualized the feasibility of applying social learning theory to vocational behavior. Though studies have since been conducted, no study has addressed these constructs as they related to decision certainty regarding academic major selection among college students. Consequently, an examination of psychosocial constructs, their relationships to one another, and their relationships to academic major decision making and the resulting decision certainty in academic major selection were undertaken in this study.

The constructs, locus of control, self-efficacy, and self-appraisal were selected for examination in the study because of the conceptual linkages between these variables and career decision making and choice. Previous research has identified locus of control and self-efficacy as important correlates in related areas such as academic achievement (Thomas et al., 1987; Wilhite, 1990; Lent et al. 1986; Mickelson, 1990; Pajares; 1996; Clarke-Stewart & Friedmen, 1983; Seligmen, 1994; Skinner, Welborn & Connell, 1990); college aspirations and expectations (Manski & Wise, 1983; Peters, 1977; Jackson, 1978; Yang, 1981; Carpenter & Fleishmen, 1987; Tuttle, 1981; Hossler & Stage, 1992); and most importantly the career decision process of adolescents and college students (Betz & Hackett, 1981; Taylor & Betz, 1983; Lent et al. 1986; Brooks, 1990; Rotter & Mulry, 1965; Stipek & Weisz, 1989).

Conceptually, self-efficacy and locus of control can be linked to academic and vocational development within the overall context of student personal development. Self-efficacy has long been identified in the psychology literature as a primary mediator of behavior and behavioral change (Bandura, 1997), influencing whether a behavior will be initiated, the amount of effort expended on the behavior, and the length of time devoted to the behavior. High self-efficacy regarding a behavior will usually lead to an increased frequency of attempting the behavior and greater effort and perseverance. Low self-efficacy, on the other hand, will usually lead to the avoidance of a particular behavior (Bandura, 1997). By attempting behaviors we judge to be within our capabilities to successfully complete and avoiding behaviors where we expect failure, we are prone to make life decisions according to perceived self-efficacy (Bandura, 1993).

This strong conceptual interaction between self-efficacy, behavior and life plans has led to its inclusion in the vocational literature by Hackett and Betz (1981) as career decision making self-efficacy. This link also supports the conclusion that college students, when involved in academic major decision-making, will also be significantly influenced by their self perceived abilities to succeed in the selection and completion of the academic major program of study.

Locus of control also can be conceptually linked to academic major decision-making and decision certainty. The extent to which the outcome of an experience is attributed to being the result of one's own actions, rather than caused by external forces, effects the strength of one's expectancy for repeated experiences of a similar nature. No matter what the experience, unless it is perceived to be the result of one's own actions, it will not be significant in altering the ways in which one sees things and

consequently the way one functions. Experiences attributed to external forces will be viewed as beyond an individual's control, and therefore unlikely to reoccur regardless of the individual's efforts. The individual, thus, is unlikely to expend any amount of significant effort toward making the experience reoccur since such effort is perceived as pointless (Lefcourt, 1982).

Therefore, an individual with an external orientation would tend to view life's rewards as being beyond one's personal control and the result of fate, luck or powerful others (Rotter, 1996). Selecting an academic major and sticking with the decision would not be seen as significant to an individual with external locus of control since selection and completion of the academic major would be based on factors beyond the individual's control. Rather, the decision and resulting outcome of reaching the academic major goal selected would be left to the influences of other people (teachers, advisors, parents and peers) or events (luck in passing courses, fate's hand in completion of requirements for graduation).

An individual with an internal orientation, on the other hand, would attribute the successful selection and completion of the academic major and it's required coursework to being the result of personal actions, rather than caused by external forces. The individual would view personal effort and mastery of content as due to their own efforts rather than due to luck or other external factors. Thus students would see behavioral outcomes as a function of personal abilities and these results would, in turn, increase additional personal efforts toward the selected academic major attainment.

In addition to examining the contribution of these psychosocial variables in relation to academic major decision-making and decision certainty, this study also

explored the role of self-appraisal within this process. Self-appraisal is an instrumental aspect of personal and career development (Erikson, 1959, 1963, 1968; Ginzberg et al, 1951; Super, 1957, 1963; Chickering, 1969) and serves as well a critical function within the decision-making process (Janis & Mann, 1977; Tiedeman & O'Hara, 1963; Harren, 1979). Across these theories and models, the analysis of the self is a principal aspect of task completion and decision-making. Self-appraisal, within the academic decision-making process, involves the degree of consciousness regarding the selection of the academic major decision to be made, the amount of thought given to alternative majors, and the level of movement students make through increasingly more thorough analysis of academic options while considering personal aspirations, needs, interests, expectations, abilities, and knowledge in order to reach a major choice through realistic self-awareness. Movement through these levels of self-appraisal is necessary in order to accomplish the task of academic major selection.

Students who have not concluded self-appraisal processes are considered less likely to have selected an academic major and the certainty behind any choice made will be tenuous. Because deciding involves considering all information, weighing alternatives, and pursuing a course of action, the self-appraisal process within career decision making is essential in major selection and resulting decision certainty with the selection.

To operationalize the three psychological constructs (self-efficacy, locus of control and self-appraisal) investigated in the study and in order to examine their relationships to students' academic decision, a student questionnaire was developed. The questionnaire contained measures of career decision-making self-efficacy,

academic motivation self-efficacy, student academic self-appraisal, locus of control of reinforcement, and decision certainty. Taylor and Betz's (1983) Career Decision-Making Self-Efficacy Scale was used to measure college students' academic major self-efficacy beliefs. The Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) was utilized to measure students' levels of self-efficacy motivation beliefs. The Student Academic Self-Appraisal Inventory (SASI) specifically developed for this study was used to provide data about students' self-appraisal during the major selection process. Rotter's (1966) Internal-External Control of Reinforcement Scale was used to measure the locus of control construct. Students' who had declared that they had already selected a major also completed the Academic Major Decision Certainty Scale (AMDCS). This scale was specifically developed for this study and was used to measure the degree of commitment to, and contentment with, the major selection after the academic major decision had been made.

Data for this study were collected from 853 undergraduate students attending Louisiana State University during the Summer 1999 semesters A and B. Students enrolled in general education courses were used in order to obtain a large sample of students in various disciplines, at various levels of academic credits earned, and with diverse degrees of major commitment. The literature shows that indecision occurs across the college years (Foote, 1989; Slaney,1980; Titley, Titley, & Wolff, 1976).

In addition to drawing specific conclusions about the decision certainty of college students after the selection of an academic major, the intent of the study was to identify theoretical, methodological and practical implications which will contribute to the existing knowledge base and perhaps inform policy decisions. From a theoretical

perspective, the information gained in the study added to our understanding of the self-appraisal, locus of control and self-efficacy constructs and the new construct of decision certainty. This study utilized these multiple variables and investigated the multivariate interrelationships among these variables. Methodologically, additional information was gained regarding the measures used to operationalize these constructs. Information from the statistical analyses completed on the instruments developed for this study (SASI and AMDCS). Finally, a better understanding of elements of academic decision making processes associated with high levels of academic major decision certainty resulted from the study. The section that follows summarizes the research hypotheses and questions framing the study and the major findings and conclusions resulting from the study.

Research Hypotheses and Questions

Hypothesis 1: Self-Efficacy Beliefs and Decision Certainty

1a: There is a statistically significant, positive relationship between college students' levels of self-efficacy beliefs about their abilities to make academic major decisions and their level of decision certainty in the major choice.

1b: There is a statistically significant, positive relationship between college students' levels of self-efficacy motivation for making academic major decisions and their level of decision certainty in the major choice.

Hypothesis 2: Self-Appraisal and Decision Certainty

There is a statistically significant, positive relationship between the strength of college students' self-appraisal and their degree of decision certainty in the selection of an academic major.

Hypothesis 3: Locus of Control and Decision Certainty

There is a statistically significant, positive relationship between the degree of college students' internal locus of control and the degree of decision certainty in the academic major choice.

In addition to the primary research hypotheses, a variety of supplemental research questions were also addressed by this study. These include:

* How much of the variation in decision certainty among students is accounted for by the combination of locus of control, self-efficacy, and the self-appraisal process variables.
* What is the relationship between the various independent variables in the study?
* What are the psychometric properties (validity and reliability) of the variables used in the study?
* Can a conceptually meaningful and statistically robust structural equations model be developed from the data that is consistent with the conceptual framework used to organize the study (See Figure 1, p. 17).
* What are the casual comparative relationships for selected subgroups of the study sample?

Major Findings and Conclusions

A large number of statistical findings from the exploration of relationships among the study variables were reported in Chapter 4 of this study. From these findings conclusions can be made relative to the purpose of the study and the additional areas of inquiry identified during the course of the study. Presented below are the findings and conclusions that are considered most important for subsequent discussion.

Major Finding Number One

The hypothesized relationships between the independent variables and academic major decision certainty were corroborated.

- Conclusion(s)

1. The psychosocial variables of self-efficacy, self-appraisal, and to a lesser degree locus of control are important elements of decision certainty.
2. Student academic self-efficacy motivation/persistence and self-appraisal are important elements of commitment and contentment with the academic major selection.

Major Finding Number Two

The academic major decision certainty and career decision making self-efficacy constructs are multi-dimensional.

- Conclusion(s):

1. Past research on the academic decision making process has been rather limited in design elements. Previous research has simply compared students who are undecided to those who are decided as a dichotomous variable. From a theoretical construct perspective, and as conceptualized and measured in this study, the academic major decision making process appears to be more complex than previously addressed in the extant literature.
2. Prior research and conceptualization of the Career Decision-Making Self-Efficacy construct (Taylor & Betz, 1983) as a five factor measure was not supported here. The conceptualization of CDMSE may be more simplistic than previously measured and may not involve a problem-solving dimension.

Major Finding Number Three

The variables studied, career decision-making self-efficacy, student academic major self-efficacy motivation, self-appraisal, locus of control, and decision certainty appear to be somewhat unstable over time.

- Conclusion(s):

1. Past literature has treated students as either decided or undecided and the stability results in this study suggest that students may fluctuate in their decisions even over relatively brief periods of time.
2. The stability coefficients for some variables measured may have been somewhat attenuated by only moderate internal consistency reliabilities reported of the measures.

Major Finding Number Four

There is little relationship among the presage variables (age, high school grade point average, college grade point average, father's education level, mother's education level, and declared or undeclared major status) or between the presage variables and the psychosocial variables studied.

- Conclusion(s)

1. Traditionally studied presage variables may not be as important to the understanding of career decision making among college students as are more conceptually rich psychosocial variables.
2. Psychosocial variables can not be explained by the presage variables, nor can students be differentiated on these variables depending upon whether they attest that they are decided or are undecided.

Major Finding Number Five

Career decision making self-efficacy and student academic self-appraisal are differentially related to dimensions of academic major decision certainty.

- Conclusion(s)

1. Academic decision certainty is a multi-dimensional, complex construct that can be partially understood from both self-efficacy and self-appraisal perspectives.

Major Finding Number Six

When the psychosocial variables were examined along with the more traditional (presage) variables in terms of their relationships to academic major decision certainty, the traditional variables did not explain or predict any variance in academic major decision certainty among students.

- Conclusion(s)

1. Past studies/findings are limited because they have traditionally focused on superficial presage variables and have not attempted to develop and utilize conceptually grounded measures to examine academic decision making and academic decision certainty like those in this study.

2. Future studies utilizing presage variables are not likely to yield information that is as important to understanding academic major decision certainty as the utilization of psychosocial variables.

Major Finding Number Seven

Decision certainty can be conceptualized and measured as a multi-dimensional, continuous variable.

- Conclusion(s)

1. Past literature describing academic major decision-making is rather limited in informing researcher, theorists, and practitioners about the decision certainty construct.
2. The decision certainty measure developed and used in this study can be used in future inquiry about the academic major decision-making process.

Supplemental Findings

Of additional interest in this study were results for the comparisons of students on the study measures by academic classification (freshman, sophomore, junior, senior) and by whether decided or undecided about a major, or who had changed or not their major. These results showed no differences between students who were either declared or not declared an academic major. Only two measures differentiated between those who had changed majors to those who attested that they had never changed majors. These findings lend further support to the conclusion that the dichotomous classification used in past research to operationalize decision certainty among college students about academic major has little validity. Additionally, the finding that the SASI and the CDMSES Major Choice scales differentiated between students who had changed their major and those that had not changed their major provides support for the known groups validity of the new SASI measure and further offers support for the validity of the factored version of the CDMSES used in this study.

The results suggest as well, that there is a need to complete additional research on students who have changed their academic majors with a focus on how they differ from those who have never changed their academic majors. In addition, future research

might focus on those who vacillate considerably among major choices and those who have changed majors numerous times.

The ANOVA results comparing students by class levels showed statistically significant differences by level on all study variables, with the exception of the locus of control measure, and particularly for comparisons of freshman and senior class groups. Seniors had higher scores in all cases on the study measures. These findings provide information that supports the differential (known groups) validity of the study measures, and empirically document what one would intuitively expect about students levels of decision making certainty, self appraisal, self-efficacy beliefs and so on.

At the conceptual level, these results lend support to differences between class levels as students matriculate toward degree attainment. However, current development models (Chickering, 1969; Erikson, 1959; Super, 1963) predict major differences should be occurring across the four years of undergraduate education. The results of this study do not strongly support current development models that describe such vast developmental growth.

It should be noted here that though statistical significance was established in these group comparisons on the study measures, the magnitude of mean differences in some instances was rather small, which raises questions about implications that can be made from the findings for future research, theory and practice.

Discussion and Implication of Major Findings

This section provides a discussion of the major findings and conclusions listed above within the context of theoretical concerns, implications for future research and practical application.

Theoretical Implications

The importance of this study to theory is three-fold. First, the study's findings contribute to the conceptual development of a comprehensive model of academic major decision-making that will result in high levels of students' decision certainty with the selection of the academic major. Second, the findings' contribution to a fuller understanding of the self-efficacy, self-appraisal, locus of control, and decision certainty constructs. Third, the findings of the study indicate implications for applying current and developing new theoretical tenants and models for decided students rather than continuing to focus on undecided students. These are discussed in turn below.

Decision Certainty Model

Results of the current study indicate the importance of psychosocial variables within the academic major decision-making process and specifically with academic decision certainty. Self-efficacy, self-appraisal, and to a lesser degree locus of control were found to be important elements of decision certainty. The study findings indicate that these variables have a role in decision certainty both individually and jointly and are predictors of effective academic major decision-making. Effective decision-making in the selection of the academic major course of study should result in decision certainty. The role of psychosocial variables in decision making and the relationships of these variables to academic major decision certainty will be presented first from a global perspective. A construct specific discussion followed by implications for research in the area of indecision are also included.

The research findings suggest that though similarities exist between the career decision making and academic major decision making domains, the two domains are in

fact measurably different. Decision making can be conceptualized as a capability that would be generalizable to different performance domains in this case the career/ vocational realm. Since academic major selection is an aspect of the career/vocational domain it is reasonable to assume this line of thinking. However, the results indicate that additional research is needed in order to more effectively conceptualize and operationalize the variables utilized in the study. Bandura (1997) expanded conceptions of self-efficacy theory and attests, given certain conditions, that efficacy beliefs can be generalized across certain capability and performance domains. The relationships reported in the study lend support to the generalized self-efficacy argument.

The results of the study indicate a level of instability in the variables of career decision making self-efficacy, student academic major self-efficacy motivation, self-appraisal, locus of control, and decision certainty over time. These results are consistent with the current literature. Extant theory of personal and career development postulates that development is an ongoing process (Erikson, 1959, 1963, 1968; Super, 1957, 1963; Ginzberg et al, 1951; Chickering, 1969). Stage models were created to mark major developmental periods and tasks and while various stage theories guided inquiry in the current study, it is well established that career development is an aspect of overall personal development. It is ongoing and continuous across the life span (Seligman, 1994).

The conceptualization of decision making as a dynamic process in which decision makers continually cycle within the various stages of decision making when new information is presented until equilibrium is regained and cognitive dissonance is

resolved. (Harren, 1979; Teideman and O'Hara, 1963; Janis and Mann, 1977, Proshaska DiClemente, and Norcross, 1992) is supported by the results of this study. These findings also support assumptions within self-efficacy theory that self-efficacy beliefs are not constant, but are dynamic. Triadic reciprocal causation results in the individual constantly evaluating aspects of the person, the environment, and behavior that are constantly interacting (Bandura, 1997).

As described above, novel information regarding ability and interests (presage variables that have been over utilized in extant vocational literature) are important aspects of decision making since new information regarding interests and abilities is utilized within psychosocial processes. Consequently, both abilities and interests are important to decision certainty. However, the link among these variables is indirect. Use of information regarding interests and abilities within psychosocial processes is shown to be imperative in making an academic major decision that results in high levels of decision certainty. For example, self-efficacy theory posits that it is not so much the knowledge of interests and abilities, but rather, the internal judgements an individual possesses and personal beliefs about what can be accomplished (based on interests, abilities, and other factors) that drive behavior (Bandura, 1997). Thus, an individual's belief about whether or not an academic major can successfully be selected and completed will lead to decision certainty.

Presage variables were included in the model due to the wide utilization of these variables in the extant literature on academic major indecision. Results of this study do not support the importance of these variables when decision certainty is conceptualized and measured as a continuous variable. Though the current study is a good first attempt

at understanding decision certainty, additional research is needed to further conceptualize and develop the construct. Future studies with more reliable measurement might shed further light on the complex relationships among the psychosocial variables in this conceptual framework that act as mediating variables of decision certainty. Discussion regarding construct conceptualization follows. The psychosocial constructs utilized in the study were found to have a relationship with decision certainty and warrant additional attention in any discussion of decision certainty.

Student Academic Self-Appraisal

Across these theories and models, the analysis of the self is a principal aspect of task completion and decision-making. Self-appraisal, within the academic decision-making process, involves the degree of consciousness regarding the selection of the academic major decision to be made, the amount of thought given to alternative majors, and the level of movement the student makes through increasingly more thorough analysis of academic options while considering one's aspirations and needs, interests, expectations, abilities, and knowledge in order to reach a major choice through realistic self-awareness. Movement through these levels of self-appraisal is necessary in order to accomplish the task of academic major selection. The current results show that the strength of students' self-appraisal is linked to higher levels of decision certainty with the academic major selection.

Students who have not concluded the self-appraisal process will be less likely to have selected an academic major and the certainty behind any choice made will be tenuous (Janis & Mann, 1977; Teideman & O'Hara, 1963; Harren, 1979). Because

deciding involves considering all information, weighing alternatives, and pursuing a course of action, the self-appraisal process within decision making is essential in major selection (Seligman, 1994; Super; 1963) and resulting decision certainty with selection. Providing students opportunities to participate in self-appraisal is recommended.

Self-Efficacy Theory

The results of this study provide information that has several implications for theories of self-efficacy. Of particular note are the contributions which can made to a) understanding of the task specific aspect of self-efficacy beliefs b) the generalization of self-efficacy beliefs across academic contexts, c) the relationship between persistence and self-efficacy beliefs, and d) the source of efficacy building in different, yet somewhat related contexts.

In this study there are indications that the self-efficacy construct can be generalized both across domains and within domains as suggested by Bandura (1997). Factor analyses of the original study sample (n=853) data set grouped items of the Career Decision Making Self Efficacy Scale (CDMSES) into four factors which conceptually were related to each other within similar aspects of decision making. The ten items operationalizing efficacious beliefs in accomplishing various vocational and academic goals in the future were defined by one factor. The nine items relating to self-determinism in assessing, planning, and carrying out career decisions were defined by a second factor. A third factor was defined by beliefs regarding information gathering, and the fourth factor consisted of aspects of academic major selection.

The Career Decision Making Self-Efficacy Scale (CDMSES) and the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) were also included as

global or uni-dimensional measures of career-decision making self-efficacy and academic major self-efficacy motivation respectively. Results of the study indicate that both multi-dimensional and uni-dimensional aspects of self-efficacy were found to be important in explaining decision certainty. Career decision making self-efficacy and student academic major self-efficacy motivation both were found to contribute to decision certainty. However, the contribution of these two forms of self-efficacy differed in that they were linked to different aspects of decision certainty. Thus, though both measures of self-efficacy were linked to academic major decision certainty (generalized), the relationships of the two self-efficacy constructs to decision certainty differed (domain specific).

The results of the study imply that motivational elements of self-efficacy are important aspects of commitment as it applies to decision certainty in the selection of an academic major. This finding lends support to recent research on self-efficacy. Self-efficacy was initially defined as the belief an individual has that s/he is able to execute a specific task successfully, in the study academic major selection, in order to accomplish a certain outcome based upon the skills s/he possesses and the circumstances faced (Bandura, 1986). Bandura (1997) currently views self-efficacy as the "belief in one's capabilities to organize and execute courses of action required to produce attainments" (p. 3). One of the central components of decision certainty is the commitment component. Self-efficacy theory states that level and strength of self-efficacy determine whether or not a behavior will be initiated, how much effort will be sustained in the face of obstacles, and how long the effort is sustained in the face of obstacles Bandura (1997).

Previous research found the inability to commit to a career decision to be a result of low self-efficacy for career decision-making (Seligman, 1994; Taylor & Betz, 1983), and that those who had yet to make a decision regarding their career had significantly less confidence in their ability to perform decision making tasks in this area (Taylor & Betz, 1983). The findings of this study are consistent with these prior studies. It should be noted, however, that the present study measured persistence/motivational elements of efficacy (consequences of various efficacy strengths) as well as perceived capabilities.

Bandura (1997) suggests that mastery experiences can produce some degree of generalized self-efficacy beliefs and that the presence of similar sub-skills is primary to mastery experience. Certainly similar sub-skills, such as information gathering, goal formation, academic motivation, etc. would all be needed to successfully select an academic major. Likewise, skills inherent in overall decision making can be identified. These findings are consistent with current views about how efficacy beliefs develop within and across domains (Bandura, 1997). Thus, efficacy strength about the ability to gather information regarding academic major choices contributes to the efficacy strength one has toward academic major decision making, and both of these contribute to the strength of efficacy beliefs one has about career decision making and overall decision making.

The results of this study fit well with the position taken by Bandura (1997) regarding the generality of efficacy beliefs. He cautions that a failure to recognize the transfer of efficacy beliefs across activities or settings would constrict people to having to establish their sense of efficacy anew with each activity attempted, acknowledging no

ability to adapt. On the other hand, a universal embracing of efficacy transferal would undermine the conceptual definition of the construct and be contrary to the genesis of efficacy beliefs. Efficacy beliefs are structured through experience, and specific experiences contribute to the development of specific efficacious beliefs. When experiences contribute to the development of multiple efficacy beliefs, then a generalized notion of efficacy can be identified which crosses capabilities and performance domains surrounding those beliefs.

Locus of Control Theory

Locus of control was included as a variable in the study because college students' locus of control has been linked in past research to various measures of career development (Noe & Steffy, 1987; Freidrich, 1988; Luzzo, 1993 a, b, c), career maturity (Luzzo, 1993b; Wu, 1991), and self-efficacy for career decision making (Taylor and Pompa, 1990). An external locus of control of reinforcement has been linked to career indecision (Cellini, 1978; Hartman & Fuqua, 1982; Taylor, 1982). Conversely, an internal locus of control has been linked to higher college student career development (Noe & Steffy, 1987; Frederich, 1988; Luzzo, 1993 a,b,c).

Despite these findings, the results of this study may offer only a small degree of support to past research. It is difficult from the results of this study to develop an understanding of the role that locus of control might well play in the academic major decision certainty and academic major decision making. The locus of control measure failed to account for much of the total variance in the multiple and single factor solutions (14.95%). In addition, the multiple factor structure identified yielded rather low reliabilities.

Though the locus of control hypothesis was not strongly supported by the study results, it seems intuitive that college students whom possess an external locus of control, developed over many life experiences, should have lower decision certainty than college students with an internal locus of control. However, a closer examination of the meaning of locus of control in view of the self-efficacy construct, may counter this perception and account for the results of this study.

The identification of academic motivation self-efficacy and career decision making self-efficacy rather than locus of control as factors that contribute to a greater degree to academic major decision certainty are consistent with the conceptual understanding of these constructs. While both self-efficacy and locus of control reflect personal belief systems, locus of control is a more global concept reflecting beliefs about causal attributions for behavior (Lefcourt, 1982). This global nature apparently does not allow for significant distinctions to be made in the orientation of an individual at the microanalytic level (Johnson, 1999). Self-efficacy, on the other hand, is microanalytic and more situation or task specific than locus of control.

Thus, for the academic major decision-making process, a student's academic motivation self-efficacy and career decision-making self-efficacy may be able to provide more detailed information necessary to making decisions, whereas, locus of control might not. Recently Bandura (1997) provided conceptual and empirical differentiation between the efficacy and locus of control constructs. "Beliefs about whether one can produce certain actions (perceived self-efficacy) cannot, by any stretch of the imagination, be considered the same as beliefs about whether actions affect outcomes (locus of control)" (Bandura, 1997, p.20). Though past research has

documented locus of control as linked to various measures of career development (Noe & Steffy, 1987; Frederich, 1988; Luzzo, 1993 a, b, c), locus of control in this study showed now statistical linkages to decision certainty.

Studying Decideness

The results of this study suggest that existing theory on indecision regarding the academic major is deficient. This study's findings are also contradicts the practice of utilizing presage variables and undecided status to explain indecision among college students. Past studies, rather than using a theory rich approach for studying academic major decision, focused primarily on the difference between decided and undecided students as a dichotomous variable (Osipow, 1983; Sepich, 1987). The dichotomous classification of decidedness in relation to college major selection has been prominent in the literature since Parson (1909/1967) advised counselors to classify clients in two main categories decided and undecided. A historical review of career indecision literature performed by Slaney (1988) found that this classification was utilized exclusively from the 1930's through the late 1970's.

This study used a different approach to operationalize decision certainty as a multi-dimensional continuous, more complex construct. The results show that this new conceptualization is linked to cognitive and affective processes by which college students' select an academic major (primarily to self-efficacy and secondarily to self-appraisal) and indicate that psychosocial variables have an important relationship to academic major decision certainty. The traditional presage variables used in past research on academic major decision making and originally included in the conceptual model (Figure I, p. 17) of decision making formulated for the study were not related to

the new conception and measurement of decision certainty. Thus, decision certainty is an active, ongoing cognitive/affective process, and is not the same as the dichotomous method of classifying decidedness.

Results from the study show that the current research is a good first attempt at the conceptualization and measurement of the academic major decision certainty construct. However, it is also obvious that additional research is needed to further conceptualize and develop the decision certainty construct. The data from this study suggests that studying presage variable will add little to our understanding of decision certainty. Future studies with more reliable measurement and psychosocial construct conceptualization might shed further light on the complex relationships among the psychosocial variables in this conceptual framework that act as mediating variables of decision certainty. Discussion regarding implications for future research follows.

Implications for Future Research

The research findings illustrate the importance of studying decided students and decision certainty with the academic major. Approximately fifty-four percent of the students in this study indicated that they had changed their major in the past. This is consistent with the estimate that 50-70% of all college students change their major before they graduate (Foote, 1989; Slaney, 1980; Titley, Titley, & Wolff, 1976). The instability among the study variables found in the current study (test/retest reliabilities) seemingly support this estimation. Future research should focus on decided students and students who change their academic major decision because decidedness alone is not necessarily a good outcome, if the decision is hastily reached or reached for reasons in conflict with student's personal characteristics (Betz, 1988). Though the unstable

aspect of the study variables can be explained by extant theory and research, further investigation is needed in order to develop better methods for measuring post-decisional stability when a major is selected.

An additional implication for future research, centers on the presage variables included in the study. These variables, well reflected in the extant literature, were not found to have any important relationship to decision certainty or the psychosocial variables included in the study. The traditional (presage) variables did little to explain or predict variance in academic major decision certainty among the students in the current sample. Thus, relationships between the psychosocial variables utilized in the study cannot be accounted for by the presage variables usually studied.

These findings are in direct conflict with traditional methods of studying undergraduate students based solely on their declared academic major status. Much of the existing literature consists of designs using a dichotomous designation for academic major (declared or undeclared). The results of this study indicate that undergraduate students can not be differentiated on the variables depending on whether they attest that they have or have not declared a major. Psychosocial variables can be utilized to study academic major decision certainty since traditional variables were found to be unimportant in understanding academic decision making and resulting decision certainty. Furthermore, future research on decision certainty should be conducted on students who have declared a major, on students who change their major, as well as those who are undecided.

Another significant implication of this study for future research concerns the measures used to operationalize the constructs of locus of control, career decision

making self-efficacy, academic self-efficacy motivation, academic self-appraisal, and decision certainty. The Internal-External Control of Reinforcement Scale (I-ECRS) proved to have considerable shortcomings and the Student Academic Self-Efficacy Motivation Scale (SAMSEMS), Career Decision Making Self-Efficacy Scale, (CDMSES), Student Academic Self-Appraisal Inventory (SASI), and the Academic Major Decision Certainty Scale (AMDCS) appear in need of further development and refinement. These issues are addressed below.

Internal-External Control of Reinforcement Scale (I-ECRS)

From the study findings, it was concluded that the locus of control measure is not necessarily appropriate for the population used in the study and may be deficient in adequately measuring the construct for other populations as well. Johnson (1999) for example, recently showed this same measure to be inappropriate (low reliability) for use with ninth-grade students.

Prior to selecting the Internal-External Control of Reinforcement Scale as the measure for the construct, a review of the scale's reliability was completed. A number of studies with varied populations reported reliability coefficients ranging from r = .69 to r = .78 (Rotter, 1966; Taylor, 1982). The reliability coefficient obtained for the one-factor solution with the current study sample were similar (r=.73) to these previously reported coeffiecients. However, the one factor solution of the Internal External Control of Reinforcement Scale explained only 14.95% of the total variance. When attempts were made to extract a multi-dimensional construct using orthogonal factor solution analyses, the alpha reliabilities obtained showed that the data were not reliable (r =-.03, r= .27, r= .50, and r = .57) for the four-factor solution.

Johnson (1999) in a study using ninth-grade students, recently noted that a problem with the Rotter scale appears to be that the dichotomous format does not adequately differentiate between sources of external control. As a result, the forced choice format can lead to an internal response when actually an external response reflects the beliefs of the respondent. There are at least two distinct dimensions along which respondents may differ in causal attributions (Collins, 1974). They may differ in the extent to which the consequences of behavior can be attributed to chance occurrences or luck, or they may differ in the extent to which consequences can be attributed to the influence of powerful others. The following example provided by Johnson (1999) illustrates this point.

> Item 21 on the questionnaire, for example, asks students to select between the following two statements: "The idea that teachers are unfair to students is nonsense." and "Most students don't realize to extent to which their grades are influenced by accidental happenings." A respondent with an external orientation derived from a strong sense of fatalism would probably select the second statement since it reflects a belief that luck plays a key role in the assignment of grades. A respondent, however, with an external orientation based on a sense that powerful others are directing the events of one's life would probably not believe that luck or fate played a role in the assignment of grades. Thus the second statement might be selected because of a stronger belief that teachers exert a dominant controlling influence. (1999, p. 172).

This question and others appear to mix the dimensions of external control, which could lead to responses that do not reflect the locus of control beliefs of the respondents. This disparity, in all likelihood, contributed significantly to the low percentage of variance explained by the measures of locus of control in this study.

One method of eliminating the possible mixing of dimensions for an external orientation may be to modify the forced choice, dichotomous format of the Rotter scale

into a Likert-type scale where respondents are asked to rate their level of agreement with each individual statement contained in the scale as has been explored in prior studies (Zuckerman & Gerbasi, 1997; Collins, 1974). Future research utilizing the locus of control as a variable mediating decision certainty may benefit from incorporating this measurement methodology and perhaps eliminating the possibility of mixing dimensions of external control of reinforcement. Given these concerns and the results of this study, the locus of control measure either needs to be considerably modified for use in future studies, or perhaps not used at all. The measure was not predictive of academic decision certainty in this study.

Career Decision Making Self-Efficacy Scale (CDMSES)

The conceptualization of career decision-making self-efficacy as multi-dimensional (Taylor & Betz, 1983) is supported in part by the results of the study. The Career Decision Making Self-Efficacy Scale (CDMSES) developed by Taylor & Betz (1983) was constructed around the five Career Choice Competencies postulated in Crites' (1978) model of career maturity. The current CDMSES utilizes five subscales of tem items thought to measure an individuals confidence in undertaking behavior in the areas of: 1) accurate self-appraisal; 2) gathering occupational information; 3) goal selection; making plans for the future; and problem solving.

Factor analysis procedures on the CDMSES completed in this study identified a four-factor solution as the most acceptable multiple factor representation of the data. The factored CDMSES subscales used in this study seemed to compare well with the first four subscales postulated by Taylor and Betz (1983) as follows: accurate self-appraisal/self-determinism; gathering occupational information/information gathering;

goal selection/major choice; making plans for the future/future orientation. In each paring listed, the first subscale title is that of Taylor and Betz (1983) while the second was the result of factor analytical procedures utilized in this study. Since a four-factor solution was utilized for this study, the problem solving subscale postulated by Taylor and Betz (1983) had no paired subscale.

Further review of the items that comprised the factored subscales of the CDMSES revealed that little actual overlap existed between the item content of the current study subscales and the subscales reported by Taylor and Betz (1983), despite similar names. The CDMSES Manual (Betz & Taylor, 1994, p. 11) also indicates that "evidence from factor analyses does not support the existence of five subscales." Findings of Taylor & Popma (1990) and Robbins (1985) suggests that the CDMSES measures career decision making behavior in a way that may be "best characterized as a generalized self-efficacy measure covering multifaceted domain of career decision-making behaviors" (Taylor & Pompa, 1990, p.28).

The results of the current study along with findings of Taylor & Pompa (1990) lend support for a generalized view of self-efficacy in the area of career decision making. It should be noted that results from the current study indicate that both generalized and multi-dimensional measures of self-efficacy can be linked with decision certainty.

An additional measurement concern with the CDMSES is that a respondent is asked to indicate the degree of confidence that s/he has that s/he could accomplish the tasks related to career decision making efficacy. Bandura acknowledges that saying that one is capable of doing something is not necessarily the same as believing in one's

ability to actually accomplish the task or behavior (1997). Similarly, attestations that one can do something are not a direct measure of the strength of efficacy beliefs. Bandura writes, "the stronger the sense of personal efficacy...the greater the perseverance and the higher the likelihood that the chosen activity will be performed successfully" (1997, p.43). Thus, future research on self-efficacy beliefs might include measures of how strongly respondents believe in their capabilities to do the task(s) being studied.

Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS)

To address the apparent shortcoming of the CDMSES and to add additional depth to the measurement of elements of self-efficacy beliefs, the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) was included in the study. Three items reflecting beliefs about task persistence were adapted from a scale (the Teacher Self and Organizational Efficacy Assessment) originally developed by Loup and Ellett (1994).

Factor analyses of the SAMSEMS identified one factor defined by two of the three original items that accounted for 76.5% of the total variance in the solution. The first item was an attempt to measure the degree of energy and effort put forth to accomplish current or possible academic major courses of study. The second item reflected the degree of persistence and perseverance students put forth in the face of obstacles to academic goal accomplishment. The third item- *To what extent would failure to accomplish your academic major goal(s) **OR** your goal(s) to obtain information about a possible academic major course of study result in DECREASING EFFORT(S) to accomplish future academic major goal(s)?* -was not retained. This item

may have been somewhat confusing to respondents as written. Though the reliability of the SAMSEMS was moderately strong (r =.69), additional research with, and possible revisions of, this new measure seem needed.

The study results identified persistence to be a separate sub-construct within the conceptual framework of self-efficacy theory. Thus, adding questions about students' willingness to continue in an endeavor when faced with obstacles and/or failure is an important aspect to be included in future self-efficacy research. These kinds of questions can provide data regarding self-efficacy beliefs relative to the total strength of efficacy and its potential behavioral consequences.

Additionally, and following this logic, future studies might be well advised to also include measurement items tapping the efficacy theory sub-construct of outcome expectation. The vast majority of studies of self-efficacy beliefs in the extant literature focus only on the measurement of the self-efficacy capabilities construct as the key element of the larger theory. By including a focus on motivational consequences of efficacy beliefs along with measures of perceived capabilities, a more comprehensive measurement system can be used. Such a system may provide more in-depth understanding of efficacy beliefs and their links to subsequent motivation and behavior. Extending the self-efficacy beliefs line of inquiry, with better measurement systems, can also lead to the development of a more robust nomological net (Cronbach & Meehl, 1955) to support self-efficacy theory.

Student Academic Self-Appraisal Inventory (SASI)

The results of this study provide support for inclusion of the self-appraisal construct within the decision-making process. The role of self-appraisal as crucial to

decision resolution and certainty has been reported by Seligman (1994), Janis and Mann (1977), and Harren (1979). The Student Academic Self-Appraisal Inventory (SASI) was specifically developed for this study. The five items of the SASI attempt to ascertain the amount of time, reflection, deliberation, and consideration students undertake to process information regarding academic majors in relation to their current and future needs, desires, values, and goals. The Alpha reliability with this sample of students was .76. Factor analyses completed with the SASI showed that the five items accounted for 51.07% of the total item variance. These initial statistical findings are encouraging on the one hand, but suggest future development and studies of the SASI are in order on the other hand. There is a need to continue the development of this self-appraisal measure in future research. The regression results reported in the study clearly link self-appraisal to elements of students' academic major decision certainty and provide criterion-referenced validity evidence for this new student academic self-appraisal measure.

Academic Major Decision Certainty Scale

Decision certainty is a construct conceptually linked to aspects of personal commitment and contentment. The construct was introduced and examined in this study in an attempt to measure the quality of an undergraduate student's major selection if the student had formally declared a major. The decision certainty construct was originally conceptualized as a construct comprised of two sub-components. However, results of the factor analysis procedures yielded a multi-dimensional construct comprised of the initial two components of commitment and contentment- and a third dimension of certainty. The commitment and contentment components have been

explained and were supported by the results of the factor analysis procedures. More information about the certainty component follows.

The certainty component consists of the following items: *1) I would pursue another academic major if I was assured it was easier to accomplish than my current major; 2) If I thought I could make more money in a different major than my current declared major, I would change majors; 3) When I think about pursuing the requirements of my current major, I experience a lot of anxiety and stress.* Seemingly, the first two items attempt to ascertain how decision certainty is effected by more superficial rather than internal processes. It stands to reason that students who indicate that they strongly agree that the ease of completion and higher financial return would be incentives to change their major are very uncertain about their current declared major. As a result these individuals would score lower on these items. The increased levels of anxiety and stress covered in the third item of the subscale are supported by cognitive dissonance theory (Festinger, 1957) which explains the role of conflict that results from making a social commitment to a major without really being committed to and content with that selection. Across the three items, is a theme of consequences (some immediate, some distant) with choosing/maintaining the major choice. As a result, higher scores on the Certainty Subscale of the Academic Major Decision Certainty Scale indicate greater certainty in the major selection despite consequences.

The multiple regression results demonstrated that certainty in the major selected is related to the self-determinism and information gathering items of the CDMSES, the external locus of control of reinforcement, and self-appraisal. These regression results indicate students who experience uncertainty regarding the declared major may retain

their selection due to reinforcement by external sources. Despite this external reinforcement students who are uncertain about their declared choice may attempt self-appraisal, information gathering, and self-determinism activities as a way to alleviate the anxiety and stress associated with the major choice.

The efforts made to conceptualize and operationalize the decision certainty construct in this study are only initial efforts, and more needs to be done to develop this measure. The conceptual framework of this study and the gaps in existing theory and research suggest a need for a construct valid and reliable measure of academic major to further a line of inquiry in decision certainty.

Replication of the Study

It should be recognized that the findings of this study are far from conclusive and that additional research is needed on the role of psychosocial variables in the academic major decision making process of students who exhibit high levels of academic decision certainty. Because of the lower reliability coefficients calculated for some of the study variables, caution should be exercised to avoid broad generalizations based upon the study results. Further, the generalizability of the results may be limited to student populations that are comparable to other land grant, state flagship, or Carnegie Foundation designated Research I Universities. An additional limit to generalizability is the fact that participation in the study was voluntary and limited to students whose faculty members gave consent.

Practical Implications

There are numerous implications for practice suggested by the results of this study. These implications focus on current practices utilized by student services

professionals, higher education administrators, and academicians in higher education settings.

Institutional Environment

The interaction that student's encounter between their personal characteristics, their behavior, and their experiences in the higher education setting represents a dynamic system that influences their self-efficacy beliefs. According to Bandura (1997), "A high sense of personal efficacy in a responsive environment that rewards valued accomplishments fosters aspirations, productive engagement in activities, and a sense of fulfillment. These are the conditions that enable people to exercise substantial control over their lives through self-development" (p.21). Institutions of higher education following this directive can conceptually possibly increase the self-efficacy of students and therefore increase students' satisfaction with post-secondary education and the college experience.

Results of the study indicate that increases in self-efficacy beliefs (student academic major motivation and career decision making) can result in increased academic decision certainty. Increased decision certainty in turn might decrease student drop, increase graduation rates, reduce the number of students on academic warning and probation, and diminish the time to completion which might also lower financial aid needs. The probability of student retention and matriculation might be increased as well. The considerable research base describing the importance of self-efficacy beliefs to human functioning (Bandura, 1997), the extant literature on self-efficacy in academic settings (Pajares, 1996) and the results of this study support the importance of the continued study of academic self-efficacy in higher education contexts.

Retention and Matriculation

One of the incentives for studying academic major decision certainty is to discover its link to the retention of college students. Though enrollment in institutions of higher education is on the rise in this country, the amount of students matriculating to degree attainment is on the decline. Undecided students are identified in the literature as at-risk for drop-out (Titley & Titley, 1985).

The results of the study suggest that one way to increase student's decision certainty is by increasing student's self-efficacy in the areas of student career decision making and academic major motivation. Persistence was identified in this study as an important behavioral aspect of efficacy beliefs (Bandura, 1997). Not only is persistence an outcome of self-efficacy beliefs, it also can reciprocally produce the highest, strongest and most generalized increases in efficacy strength and beliefs (Bandura, 1982).

When an individual is able to master a difficult situation, the influences in creating strong self-percepts of efficacy are greater than those produced by persuasion or vicarious experiences (Bandura, 1997). This seems particularly important as ways are developed to enhance the strength of efficacious beliefs of college students regarding the academic major selection and their decision certainty.

Using mastery experiences with new and continuing students is one strategy that can be employed to strengthen students' self-efficacy beliefs regarding the academic major decision making process. Increasing the strength of self-efficacy motivation and persistence related to academic decision can strengthen overall decision making which, can in turn increase students' decision certainties.

Career Service Professionals and Academic Advisors

A major application of the results of this study is that it is not sufficient to focus only on undecided students in career and academic advising. The Academic Major Decision Certainty Scale at some point may be an instrument that can be used with students to measure their decision certainty when they declare a major and, if applicable subsequently change their major. At the very least, the items of the AMDCS that exhibit the highest reliability can begin to be used to start a dialogue with students as they declare and/or change their major. This dialogue would center around the levels of commitment to, contentment with, and uncertainty regarding the decision that the students may be encountering. Appropriate intervention and activities could ensue accordingly.

Additionally, career services professionals and academic advisors need to create specialized services and programs for various groups of high-risk students who are undecided, those who are in the process of deciding, and those who have decided. Within this programming, traditional methods such as identifying interests and abilities should be continued for the benefit of self-appraisal. However, of paramount importance is the incorporation of factors aimed at increasing the academic major motivation and career decision-making self-efficacy beliefs of students.

Bandura (1997) posits four factors that contribute to the development of individual's self-efficacy beliefs: a) inactive mastery experiences, b) vicarious experiences, c) verbal persuasion and d) psychological and affective states. Interventions and activities can easily be designed around these factors to enhance the development of self-efficacy beliefs among students.

Inactive mastery experiences are typically described as the most potent source for the development of self-efficacy beliefs. The development of mastery experiences may be the most powerful determinant of efficacy and should be an important component of any approach, but other components must also be employed. Some students may be more inclined to develop positive efficacious beliefs through modeling (vicarious experiences) or encouragement (verbal persuasion).

The theoretical richness of self-efficacy within social cognitive theory and the extensive research documenting linkages between self-efficacy and behavior (Bandura, 1997) support the importance this construct has for student services work in higher education settings. Thus, a basic working knowledge of efficacy seems needed by career services professionals and academic advisors in institutions of higher education in order to ensure programming is effective. Examples of efficacy building interventions would included:

1) Interventions in advising could incorporate realistic feedback to students during course advisement and scheduling regarding abilities, experiences, etc., and subsequent match to course work in a way that increases the probability of success and decreases the probability of failing (enactive mastery experiences).

2) Advisors could also establish "early warning" systems when student experience difficulty by targeting known at-risk groups.

3) Modeling success, perhaps utilizing a peer mentoring component, tutoring, or senior to freshmen pairing could be incorporated by academic units or colleges

4) Verbal persuasion/ social recognition and reinforcement programs that emphasize improvement rather than absolute or set grade achievement.

5) Instructional workshops could be offered to help students set realistic goals.

6) Assignment in advising sessions of tasks such as career exploration activities and academic enrichment such as time management, study skills, resume writing, learning style, etc.

7) Periodic reflection and self-appraisal activities regarding major choice (i.e., meeting with faculty members, completing vocational assessment inventories). Use as baseline measure and revisit at regular intervals.

In-service education for academic and career personnel and the careful development and monitoring of efficacy building strategies by knowledgeable practitioners are seemingly important pedagogical concerns. Addressing these concerns, could result in increased decision certainty among students.

Academicians

The results of the study indicate that academic major motivation is linked to decision certainty in the academic major selection, therefore, faculty members in higher education settings should also strive to incorporate factors that increase academic self-efficacy motivation in their instruction. One fundamental goal of higher education reflecting efficacy theory is to equip students with self-regulatory capabilities that enable them to continue to educate themselves in order to functional successfully in society. "Self-regulation encompasses skills for planning, organizing and managing instructional activities; enlisting resources; regulating one's own motivation; and applying metacognitive skills to evaluate the adequacy of one's knowledge and strategies." (Bandura, 1997, p. 175) A strong belief in self-regulatory efficacy contributes to success in academic subject matter by building a sense of cognitive

efficacy and raising academic aspirations (Zimmerman, Bandura and Martinez-Pons, 1992).

The development of mastery experiences should be carefully addressed. It is unrealistic to expect college students to develop positive beliefs of academic self-efficacy if presented with tasks which are so difficult that a high potential for failure exists. In fact, repeated failures have a deleterious effect on building self-efficacy (Bandura, 1997). Pedagogically, learning and efficacy building should take place simultaneously using small incremental steps allowing all students to progress. Thus, the building of academic self-efficacy is an important element of pedagogy and a significant concern in the development of the optimally functioning higher education environment. The results of this study support these recommendations.

Chapter Summary

Following a general overview of the study, Chapter 5 presented a summary and discussion of the study's major findings and conclusions. The discussion included implications for theory, future research and practice.

Dissertation Summary

This document describes a study of 853 undergraduate college students attending a Carnegie Foundation Category Research One University in an urban environment in the southern United States. The study described was designed to determine factors which facilitate decision certainty in the selection of the academic major. Previous research in this area has focused on the difference between decided and undecided students as a dichotomous variable or focused strictly on the varying degrees of indecision. This research focused on the factors contributing to academic

decision certainty in relation to the selection of an academic major. The conceptual framework guiding this study was grounded in psychological theory and built around the constructs of locus of control, academic and career decision making self-efficacy, and self-appraisal as mediating variables that contribute to decision certainty. Particular attention was given to students who had already declared an academic major since previous research has primarily focused on undecided students and has not adequately explained the processes by which college students make an academic major decision that results in high decision certainty once the selection of a major has been made.

A variety of statistical procedures were used to derive information regarding the relationships between study variables. These procedures included a) factor analyses; b) Cronbach Alpha internal consistency reliability analyses of instrument scores and subscales; and c) correlation analyses of study variables including bivariate correlations, multiple regressions and partial correlations.

Major findings of the study showed that: a) self-efficacy, self-appraisal, and to a lesser degree locus of control are important elements of decision certainty; b) the constructs of academic major decision certainty and career decision making self-efficacy are multi-dimensional; c) the variables studied, career decision making self-efficacy, student academic major-self-efficacy, self-appraisal, and decision certainty appear to be somewhat unstable over time; d) little relationship exists between presage variables (age, high school grade point average, undeclared major status, etc.) or between the presage variables and the psychosocial variables; e) career decision making self-efficacy and student academic self-appraisal are differentially related to dimensions of academic decision certainty, f) when the psychosocial were examined along with the

more tradition variables in terms of their relationship to academic major decision certainty, the traditional variables did little to explain or predict any variance in academic major, and g) decision certainty can be conceptualized and measured as a multi-dimensional, continuous variable.

These findings were synthesized in terms of a set of major findings and conclusions and were discussed in view of their implications for theory, future research and practical application.

REFERENCES

Abel, W. H. (1966). Attrition and the student who is certain. Personnel and Guidance Journal, 44, 1042-1045.

Ashby, J. D., Wall, H. W., & Osipow, S. H. (1966). Vocational certainty and indecision in college freshman. Personnel and Guidance Journal, 44, 1037-1041.

Astin, A. W. (1971). Predicting academic performance in college. New York: Free Press.

Astin, A. W. (1975). Preventing students from dropping out. San Francisco: Jossey-Bass.

Astin, A. W. (1977). Four critical years: Effects of college on beliefs, attitudes, and knowledge. San Francisco: Jossey-Bass.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychology Review, 84, 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologists, 37, 122-147.

Bandura, A. (1986). Social foundations of thought and action. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1989). Children's self-efficacy scale. Unpublished manuscript.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. Educational Psychologist, 28, (2), 117-148.

Bandura, A. (1997). Self-Efficacy: The exercise of control. New York: W. H. Freeman

Bandura, A., & Wood, R. E. (1989). Effect of perceived controllability and performance standards on self-regulation of complex decision making. Journal of Personality and Social Psychology, 56, 805-814.

Beal, P. E., & Noel, L. (1980). What works with student retention? Iowa City, IA: American College Testing Program and National Center for Higher Education Management Systems.

Betz, N. E.(1988). The assessment of career development and maturity. In W. B. Walsh & S. H. Osipow (Eds.), Career Decision Making (pp. 77-136). Hillsdale, NJ: Erlbaum.

Betz, N. E. (1994). Self-concept theory in career development and counseling. The Career Development Quarterly, 43, 32-42.

Betz, N. E., & Hackett, G. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college women and men. Journal of Counseling Psychology, 28, 399-410.

Betz, N. E., & Hackett, G. (1983). The relationship of mathematics self-efficacy expectations to the selection of science-based college majors. Journal of Vocational Behavior, 23, 329-345.

Betz, N. E. & Hackett, G. (1986). Applications of self-efficacy theory to understanding career choice behavior. Journal of Social and Clinical Psychology, 4, 279-289.

Betz, N. E., & Voyten, K. K., (1997). Efficacy and outcome expectations influence on career exploration and decidedness. The Career Development Quarterly, 46, 179-189.

Betz, N. E., & Taylor, K. (1994). Career Decision Making Self-Efficacy Scale Manual. Unpublished manuscript, Department of Psychology, Ohio State University, Columbus, OH.

Blackman, S. (1962). Some factors affecting the perception of events as chance determined. Journal of Psychology, 54, 197-202.

Blustein, D. L. (1989). The role of goal instability and career self-efficacy in the career exploration process. Journal of Vocational Behavior, 35, 194-203.

Borgen, F. H. (1991). Megatrends and milestones in vocational behavior: A 20 year counseling psychology retrospective. Journal of Vocational Behavior, 39, 263-290.

Bowers, K. S. (1973). Situationalism in psychology: An analysis and critique. Psychological Review, 80, 307-336.

Brooks, L. (1990). Recent development in theory building. In D. Bloom, L. Brooks, & Associates (Eds.), Career Choice and Development: Applying Contemporary Theories to Practice, (pp. 364-394). San Francisco, Jossey Bass.

Brown, D. (1987). The status of Holland's theory of vocational choice. Career Development Quarterly, 36(1), 13-23.

Buehler, C. (1933). Der menschliche lebenslauf als psychologische problem. Leipzig: Hirzel.

Bureau of Census. (1994). Statistical Abstract of the United States. Washington, DC: United States Department of Commerce.

Bureau of Census. (1990). Statistical Abstract of the United States. Washington, DC: United States Department of Commerce.

Cardi, M. (1962). An examination of internal verses external control in relation to academic failures. Unpublished master's thesis, Ohio State University, Columbus.

Carpenter, P. & Fleishman, J. (1987). Linking intentions and behavior: Austrailian students' college plans and college attendance. American Educational Research Journal, 24, (1), 79-105.

Cellini, J. V. (1978). Locus of control as an organizing construct for vocational indecision and vocational differentiation. (Doctoral dissertation, The Ohio State University, 1978). Dissertation Abstracts International, 39, 40004-B.

Chickering, A. W. (1969). Education and identity. San Francisco: Jossey Bass.

Chickering, A. W. & Reisser, L. (1993). Education and identity, (2nd ed.), San Francisco: Jossey-Bass.

Clarke-Stewart, A. & Freidman, S. (1983). Cognitive development. Child development: Infancy through adolescence. New York: John Wiley and Sons.

Clarke, J.S. & Ellett, C. D., (1997). Personal and organizational structure correlates of receptivity and resistance to change and effectiveness in institutions of higher education. (Doctoral dissertation, Baton Rouge, LA: College of Education. Louisiana State University).

Collins, B. E. (1974). Four separate components of the Rotter I-E scale: Belief in a difficult world, a just world, a predictable world and politically responsive world. Journal of Social Psychology, 29, 381-391.

Crites, J. O. (1965). Measurement of vocational maturity in adolescence: I. Attitudinal Scales of the Vocational Development Inventory. Psychological Monographs, 79 (2, whole No. 595).

Crites, J. O. (1969) Vocational psychology. New York: McGraw-Hill.

Crites, J. O. (1973/1978). Career Maturity Inventory. Monterey, CA.: CTB/McGraw Hill.

Crites, J. O. (1976). A comprehensive model of career development in early adulthood. Journal of Vocational Behavior, 9, 105-118.

Cronbach, L.J. & Meehl, P. E. (1955). Construct validity in psychological tests. American Psychologist, 52, 281-302.

Crowne, D. P. & Marlowe, D. (1964). The Approval Motive. New York: Wiley.

Danis, E. J. (1989). Exploring the uncertain but hopeful future. NACADA Journal, 9(1), 3-4.

Daubman, K., & Johnson, D. H. (1982). Comparisons among continuing, withdrawing, and non-returning students. Academic Leave and Withdrawal Office Research Report, Student Affairs Report #7, University of Maryland, (ERIC Document Reproduction Services No. ED 233 628).

Delworth, U., Hanson G. R., & Associates. (1991). Student services: A handbook for the profession. (2nd ed.). San Francisco: Jossey-Bass.

Dole, A. A. (1969). Factors in educational decisions among public school pupils. Psychology in Schools, 6, 73-79.

Druckman, D. And Bjork, R. A. (1994). Learning, Remembering, Believing. National Academy Press: Washington, D.C.

Earley, P. C. (1993). East meets West meets Mideast: Further explorations of collectivistic and individualistic work groups. Academy of Management Journal, 36, 319-348.

Ellett, C.D., Hill, F.H., and Lui, X. (in press). Professional learning environment and human caring correlates of teacher efficacy. Learning Environments Research: An International Journal. Kluwer Academic Publishers.

Elliot, E. (1984). Change of major and academic success. NACADA Journal, 4, 39-45.

Ellison, A. & Simon, B. (1973). Does college make a person healthy and wise? In L. Soloman & P. Taubman (Eds.), Does college matter? New York: Academic Press.

Elton, C.F., & Rose, H. A. (1971). Longitudinal study of vocationally undecided male student. Journal of Vocational Behavior, 1, 85-92.

Endler, N. S., and Magnusson, D. (1975). Interactional psychology and personality. Washington, DC: Hemisphere.

Erikson, E. (1959). Identity and the life cycle. Psychological Issues Monograph, 1(1), 1-171. New York: International Universities Press.

Erikson, E. (1963). Childhood and society. (2nd ed.). New York: W. W. Norton.

Erikson, E. (1968). Identity: Youth and crisis. New York: W. W. Horton.

Ewen, L. E. (1988). An introduction to theories of personality. (3rd ed.). Hilsdale, NJ: Lawrence Erlbaum Associates.

Feldman, K. & Newcomb, T. (1969). The impact of college on students. San Francisco: Jossey-Bass.

Feltz, D. L. (1988). Gender differences in the causal elements of self-efficacy on a high avoidance motor task. Journal of Sport and Exercise Psychology, 10, 151-166.

Festinger, L. A. (1957). A theory of cognitive dissonance. Stanford, CA: Stanford Unversity Press.

Foote, B. (1980). Determined- and undetermined- major students: How different are they? Journal of College Student Personnel, 21, 29-43.

Forsyth, D. R. (1987). Social psychology. Monteray, CA: Brooks/Cole Publishing Company.

Frederich, J. (1988). The influence of locus of control on student aspirations, and information preferences for summer work. Journal of College Student Development, 29, 335-339.

Gilligan, C. (1982). In a different voice: Psychological theory and women's development. Cambridge: Harvard University Press.

Ginzberg, E., Ginsburg, S. W., Axelrad, S., & Herma, J. L. (1951). Occupational choice: An approach to a general theory. New York: Columbia University Press.

Gordon, V. N. (1985) Students with uncertain academic goals. L Noel, R. Levitz, & Saluri, D. (Eds.) Increasing student retention. (pp. 116-137). San Francisco: Jossey Bass.

Gordon, V. N., & Polson, C. (1985). Students needing academic alternatives advising: A national survey. NACADA Journal, 5, 77-84.

Hackett, G., & Betz, N. E. (1981). A self-efficacy approach to the career development of women. Journal of Vocational Behavior, 18, 326-336.

Hackett, G., & Betz, N. E. (1987). Concept of agency in educational and career development. Journal of Counseling Psychology, 34(3), 299-308.

Hackett, G., Casas, J. M., Betz, N. E., & Rocha-Singh, I. (1987, August). Self-efficacy, race, and gender: Relations to progress in engineering majors. Paper presented at the meeting of the American Psychological Association, New York.

Hackett, G., & Lent, R. W. (1992). Theoretical advances and current inquiry in counseling psychology. In S. D. Brown & R. W. Lent, Jr. (Eds.), Handbook of counseling psychology (2nd ed., pp. 419-452). New York: Wiley.

Harren, V. A. (1979). A model of career decision making for college students. Journal of Vocational Behavior, 14, 119-133.

Harren, V. A., Daniels, M. H., and Buck, J. N. (1981). Facilitating students' career development. San Francisco: Jossey-Bass.

Harren, V. A., Kass, R. A., Tinsley, H. E. A., and Moreland, J. R. (1978). The influence of sex roles and cognitive styles on career decision making. Journal of Counseling Psychology, 25(5), 390-398.

Hartman, B. W., & Fuqua, D. R. (1982). The construct validity of the Career Decision Scale adapted for graduate students. Vocational Guidance Quarterly, 31, 69-77.

Herr, E. L., & Cramer, S. H. (1992). Career Guidance and Counseling through the Lifespan: Systematic Approaches. (4th ed.). New York: HarperCollins.

Hilton, T. J. (1962). Career decision-making. Journal of Counseling Psychology, 9, 291-298.

Holland, J. L. (1966). The psychology pf vocational choice: A theory of personality types and model environments. Waltham, Mass.: Blaisdell.

Hossler, D. & Stage. F/ (1992). Family and high school experience influences on the post-secondary educational plans of ninth-grade students. American Educational Research Journal, 29(2), 425-451.

Jackson, G. A. (1978). Financial aid and student enrollment. Journal of Higher Education, 49, 548-574.

Janis, I. L., & Mann, L. (1977). Decision making. New York: The Free Press.

Johnson, F. Y. (1961). Political attitudes as related to internal and external control. Unpublished master's thesis, Ohio State University, Columbus.

Johnson, S. E. (1999). College choice: Psychological factors influencing postsecondary aspirations and expectations of ninth-grade students. Unpublished doctoral dissertation, Department of Educational Leadership, Research, and Counseling, Louisiana State University.

Kaldor, D., & Zttowski, D. (1969). A maximizing model of occupational decision-making. Personnel and Guidance Journal, 47, 781-788.

Kaplan, D. M., & Brown, D. (1987). The role of anxiety in career indecisiveness. The Career Development Quarterly. December, 48-62.

Kegan, R. (1982). The evolving self: Problem and process in human development. Cambridge: Harvard University Press.

Kiersey, D. And Bates, M. (1978). Please understand me: Character and temperament types. (3rd ed.). California: Prometheus Nemesis Books.

Kitchener, K. S., and King, P. M. (1981). Reflective judgement: Concepts of Justification and their relationship to age and education. Journal of Applied Developmental Psychology, 2, 89-116.

Knefelkamp, L., Widick, C., & Parker, C. (Eds.). (1978). Applying new developmental findings. (New Directions for Student Services No. 4). San Francisco: Jossey-Bass.

Kocher, E., & Pascerella, E. (1988). The effects of institutional transfer on status attainment. Paper presented at the meeting of the American Educational Research Association, New Orleans.

Kohlberg, L. (1969). Stage and sequence: the cognitive-developmental approach to socialization. In D. Goslin (Ed.), Handbook of Socialization Theory and Research. Skokie, Ill.: Rand-McNally.

Krumboltz, J. D., Mitchell, A. M., & Jones, G. B. (1976). A social learning theory of career selection. The Counseling Psychologists, 6, 71-81.

Layton, P. L. (1984). Self-efficacy, locus of control, career salience, and women's career choice. Unpublished doctoral dissertation, Department of Psychology, University of Minnesota, Minneapolis.

Lefcourt, H. M. (1976). The locus of control: Current trend in theory and research. New York: Wiley.

Lefcourt, H. M. (1981). Research with the locus of control construct. Assessment Methods (1). New York: Academic Press.

Lefcourt, H.M. (1982). Locus of Control. New York: John Wiley & Sons.

Lefcourt, H. M., & Ladwig, G. W. (1965). The American Negro: A problem in expectancies. Journal of Personality and Social Psychology, 1, 377-380.

Lent, R. W., Brown, S. D., & Hackett, G. (1994).Toward a unifying theory of career and academic interest, choice, and performance. Journal of Vocational Behavior, 45, 79-122.

Lent, R. W., Brown, S. D., & Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. Journal of Counseling Psychology, 31, (3), 356-362.

Lent, R. W., Brown, S. D., & Larkin, L. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. Journal of Counseling Psychology, 33, 265-269.

Lent, R. W., Brown, S. D., & Larkin, K. C. (1987). Comparison of three theoretically derived variables in predicting career and academic behavior: Self-efficacy, interests congruence, and consequence thinking. Journal of Counseling Psychology, 34 (3), 293-298.

Lent, R. W., & Hackett, G. (1987). Career self-efficacy: Empirical status and future directions [monograph]. Journal of Vocational Behavior, 30, 347-382.

Lent, R. W., & Hackett, G. (1994). Sociocognitive mechanisms of personal agency in career development: Pantheoretical prospects. In M. L. Savickas & R. W. Lent (Eds.), Convergence in career development theories: Implications for science and practice (pp. 77-102). Palo Alto, CA: Consulting Psychologists Press.

Lewallen, W. (1993). The impact of being undecided on college-student persistence. Journal of College Student Development, 34, 103-112.

Lewin, K. (1947). Frontiers in group dynamics. Human Relations, 1, 5-41.

Loup, K. S. (1994). Measuring and linking school professional learning environment characteristics, teacher self and organizational efficacy, receptivity to change, and multiple indexes of school effectiveness. Unpublished doctoral dissertation. Louisiana State University.

Loupe, K. S., & Ellett, C. D. (1994). Teacher's self and organizational efficacy assessment (TSOEA). Baton Rouge, LA: College of Education, Louisiana State University.

Luzzo, D. A., (1993a). The relationship between undergraduates' locus of control and career development. Journal of College Student Development, 34, 227-28.

Luzzo, D. A., (1993b). Predicting the career maturity of undergraduates: A comparison of personal, educational, and psychological factors. Journal of College Student Development, 34, 271-275.

Luzzo, D. A. (1993c). Value of career decision-making self-efficacy in predicting career decision making attitudes and skills. Journal of Counseling Psychology, 400, 194-199

Mahoney, M. J., & Patterson, K. M. (1992). Changing theories of change: Recent developments in counseling. In S. D Brown & R. W. Lent (Eds.), Handbook of counseling psychology (2nd ed., pp. 665-689). New York: Wiley.

Marcia, J. (1966). Development and validation of ego-identity status. Journal of Personality and Social Psychology, 3, 551-559.

Manski, C. & Wise, D. (1983). College choice in America. Cambridge, MA: Harvard University Press.

McAuley, E. (1992. Understanding exercise behavior: A self-efficacy perpesctive. In G. C. Roberts (ED.), Motivation in sports and exercise. (pp. 107-126). Champaign, Ill.: Human Kinetics.

Meyers, I. B. (1980). Gifts differing. California: Consulting Psychologists Press.

Mickelson, R. A. (1990). The attitudes-achievement paradox among Black adolescents. Sociology of Education, 63, 44-61.

Miller, N. E. (1944). Experimental studies of conflict. In Hunt, J. (Ed.), Personality and the behavior disorders. New York: Ronald Press. (pp.431-465).

Mitchell, L. K., & Krumboltz, J. D. (1990). Social learning approach to career decision making: Krumboltz's theory. In D. Brown, L. Brooks, & Associates (Eds.), Career choice and development: Applying contemporary theories to practice (2nd ed., pp. 145-196). San Francisco: Jossey-Bass.

Multon, K., Brown, S. .D, & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. Journal of Counsleing Psychology, 38(1), 30-38.

Muskat, H.(1979). Educational expectations and college attrition. NASPA Journal, 17, 17-22.

Newman, J. L., Fuqua, D. R., & Minger, C. (1990). Further evidence of the use of career subtypes in defining career status. Career Development Quarterly, 39(2), 178-188.

Noe, R. A., & Steffy, B. D. (1987). The influence of individual characteristics and assessment center evaluation on career exploration behavior and job involvement. Journal of Vocational Behavior, 30, 187-202.

Noel, L. (1985). Increasing student retention: New challenges and potential. In L. Noel, R. Levitz, D. Saluri, & Associates, Increasing student retention (pp. 1-27). San Francisco: Jossey-Bass.

O'Leary, A. (1985). Self-efficacy and health. Behavior Research and Therapy, 23, 437-451.

Osipow, S. H. (1983). Theories of career development (3rd. Ed.) Englewood Cliffs: NJ: Prentice Hall.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. Review of Educational Research, 66 (4), 543-578.

Parsons, F. (1909/1967). Choosing a vocation. New York: Agathon Press.

Pascerella, E. T. & Terenzini, P. T. (1991). How college affects students. San Francisco: Jossey-Bass.

Perry, W. G. (1970). Forms of intellectual and ethical development in the college years: A scheme. Troy, Mo: Holt, Rinehart, & Winston.

Peters, W. B. (1977). Fulfillment of short-term educational plans and continuance in education. Washington, DC: National Center of Educational Statistics.

Peterson, S. L. (1993). Career decision-making self-efficacy and social and academic integration of under prepared college students based on background characteristics. Journal of Vocational Education Research, 18 (1), 77-115.

Phillips, S. D., & Blustein, D. L. (1994). Readiness for career choices: Planning, exploring, and deciding. The Career Development Quarterly, 43, 63-73.

Piaget, J. (1948). The moral judgement of the child. New York: Free Press.

Piaget, J. (1952). The origins of intelligence in children. New York: International University Press.

The private investment value of higher education 1967-1996. (March, 1998) Postsecondary Education Opportunity, 69.

Prochaska, J. O., DiClemente, C. C., & Norcorss, J. C. (1992). In search of how people Change: Applications to addictive behaviors. American Psychologists, 47, (9), 1102-1114.

Raskin, P. M. (1987). Vocational counseling. New York: Teachers College Press.

Reeve, J. (1996). Motivating Others: Nurturing inner motivational needs. Needham Heights, Massachusetts: Ally & Bacon.

Robbins, S. B. (1985). Validity estimates for the Career-Decision Making Self-Efficacy Scale. Measurement and Evaluation in Counseling and Development, 18, 64-71.

Rotter, J. B. (1954). Social learning and clinical psychology. Englewood Cliffs, NJ: Prentice Hall.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80, Whole No. 609.

Rotter, J. B. (1975). Some problems and misconceptions related to the construct of internal verses external control of reinforcement. Journal of Consulting and Clinical Psychology, 43, 56-67.

Rotter, J. B. (1990). Internal versus external control of reinforcement: A case history of a variable. American Psychologist, 45, 489-493.

Rotter, J. B. & Mulry, R. (1965). Some problems and misconceptions related to the construction of internal versus external control of reinforcement. Journal of Consulting and Clinical Psychology, 43, 56-67.

Sadri, G., & Robertson, I. T. (1993). Self-efficacy and work-related behavior: A review and meta-analysis. Applied Psychology: An International Review, 42, 139-152.

SAS Institute, Inc. (Author). (1982). SAS User's Guide: Statistics, Version 5 Edition. Cary, NC.

Savickas, M. L. (1989). Annual review: Practice and research in career counseling and development, 1988. Career Development Quarterly, 38(3), 275-284.

Schunk, D. H. (1982). Effects of effort attributional feedback on children's perceived self-efficacy and achievement. Journal of Education Psychology, 74, 548-556.

Schunk, D. H. (1984). Enhancing self-efficacy and achievement through rewards and goals: Motivational and informational effects. Journal of Educational Research, 78, 29-34.

Schunk, D. H. (1989). Self-efficacy and cognitive skill learning. In C. Ames & R. Ames (Eds.), Research on motivation in education: goals and cognition (Vol. 3, pp. 13-44). San Diego: Academic Press.

Schunk, D. H. (1991). Self-efficacy and academic motivation. Educational Psychologist, 26, 201-231.

Seligman, L. (1994). Developmental career counseling and assessment (2nd ed.).Thousand Oaks, California: Sage Publications, Inc.

Sepich, R. T. (1987). A review of correlates and measurements of career indecision. Journal of Career Development, 14, 8-23.

Siegel, R. G., Galassi, J. P., & Ware, W. B. (1985). A comparison of two models for predicting mathematics performance: Social learning versus math aptitude-anxiety. Journal of Counseling Psychology, 32, 531-538.

Simms, J. J. (1983). Academic and vocational decision-making patterns among academically undecided college freshmen. Unpublished doctoral dissertation. University of California, Los Angeles.

Skinner, E., Wellborn, J., & Connell, J. (1990). What it takes to do well in school and whether I've got it: A process model of perceived control and children's engagement and achievement in school. Journal of Educational Psychology, 82(1), 22-32.

Slaney, R. B. (1980). Expressed vocational choice and vocational indecision. Journal of Counseling Psychology, 27, 122-129.

Slaney, R. B. (1988). The assessment of career decision making. In W. B. Walsh & S. H. Osipow (Eds.), Career decision making (pp 37-77). Hillsdale: NJ: Erlbaum.

Smitherman, H. O., & Carr, L. L. (1981) Persistence patterns of noncurricular students in community colleges. Community/Junior College Research Quarterly, 5(4), 367-375.

Spokane, A. R., & Hawks, B. K. (1990). Annual review: Practice and research in career counseling and development. Career Development Quarterly, 39, 98-128.

Steele, G. E., Kennedy, G. J., & Gordon, V. N. (1993). The retention of major changers: A longitudinal study. Journal of College Student Development, 34, 58-62.

Stipek, D. & Weisz, J. (1981). Perceived personal control and academic achievement. Review of Educational Research, 51, 101-137.

Super, D. E. (1957). The psychology of careers. New York: Harper & Row.

Super, D. E. (1963). Vocational development in adolescence and early adulthood: tasks and behaviors. In D. E. Super, R. Starishevsky, N. Matlin, & J. P. Jordaan (Eds.), Career development: Self-concept theory, (pp75-95). New York: College Entrance Examination Board.

Super, D. E., Crites, J. O., Hummer, R. C., Moser, H. P., Overstreet, P. L., & Warnath, C. (1957). Vocational development: A framework for research. New York: Teachers College Press.

Taylor, K. M. (1982). An investigation of vocational indecision of college students: Correlates and moderates. Journal of Vocational Behavior, 21, 318-329.

Taylor, K. M., & Betz, N. E., (1983). Applications of self-efficacy theory to the understanding and treatment of career indecision. Journal of Vocational Behavior, 22, 63-81.

Taylor, K. M. & Popma, J., (1990). Construct validity of the career decision making self-efficacy scale and the relationship of CDMSES to vocational indecision. Journal of Vocational Behavior, 37, 17-31.

Thomas, J., Iventosch, L., and Rohwer, W. (1987). Relationships among student characteristics, study activities, and achievement as a function of course characteristics. Contemporary Educational Psychology, 12, 344-364.

Tiedeman, D. V., & O'Hara, R. P. (1963). Career development: Choice and adjustment. New York: College Entrance Examination Board.

Tinto, V. (1987). Leaving college: Rethinking the causes and cures of student attrition. Chicago: University of Chicago Press.

Titley, R. W., & Titley, B. S. (1980). Initial choice of college major: Are only the "undecidedness" undecided? Journal of College Student Personnel, 21(4), 293-298.

Titley, R. W. & Titley, B. S. (1985). Initial choice of college major and attrition: The "decided" and "undecided" after 6 Years. Journal of College Student Personnel, 465-466.

Titley, R. W., Titley, B. S., & Wolff, W. (1976). The major-changers: Continuity or discontinuity in the career decision process? Journal of Vocational Behavior, 8, 105-111.

Tuttle, R. (1981). A path analytical model of the college going decision. Boon, NC: Appalachian State University.

Unruh, W. R. (1979) Career decision making: Theory construction and evaluation. In Mitchell, A. M., Jones, G. B., & Krumboltz, J. D. (Eds.), Social learning and career decision making. (pp. 5-18) Rhode Island: The Carroll Press.

Van Matre, G. & Cooper, S. (1984). Concurrent evaluation of career indecision and indecisiveness. Personnel and Guidance Journal, 62(10), 637-639.

Vander Zanden, J. W. (1993). Human development. (5th ed.) New York: McGraw-Hill, Inc.

Wheeler, K. G. (1983). Comparisons of self-efficacy and expectancy models of occupational preferences for college males and females. Journal of Occupational Psychology, 56, 73-78.

Widick, C., Parker, C., & Knefelkamp, L. (1978). Erik Erikcon and psychosocial development. In L. Knefelkamp, D. Widick, & C. Parker (Eds.), Applying New Developmental Findings (New Directions for Student Services No. 4). San Francisco: Jossey-Bass.

Wilhite, S. C. (1990). Self-efficacy, locus of control, self-assessment of memory ability and study activities as predictors of college course achievement. Journal of Educational Psychology, 82, 696-700.

Wu, W. Y. (1991, April). Career development of international students: A structural investigation. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Yang, S. W. (1981). Rural youth's decisions to attend college: Aspirations and Realizations. Paper presented at the Annual Meeting of the Rural Sociological Association, Guelph, Ontario, July.

Zimmerman, B. J., Bandura, A., & Martinez Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal-setting. American Educational Research Journal, 23, 614-628.

Zuckerman, M. & Gerbasi, K. C. (1977). Dimensions of the I-E scale and the relationship to other personality measures. Educational and Psychological Measurement, 37, 157-175.

APPENDIX A:

GENERAL EDUCATION REQUIREMENTS AND COURSES

Table A.1

General Education Requirements and Courses

Area/Course Number	Title	Semester Hours
I. English Composition		6
English		
1000*+	English Composition	3
1001*+ (1004)	English Composition	3
1002*+ (1003/1005)	English Composition	3
Honors		
1001	Seminar in Ancient Western Civilization	3
1101	Seminar in Comparative Civilizations	3
II. Analytical Reasoning		6
Computer Science		
1248	Programming with Applications in Statistics	3
Experimental Statistics		
2201	Introduction to Statistical Analysis	4
4001	Statistical Methods	4
Mathematics		
1020*+	College Algebra: Five-Hour Format	3
1021*	College Algebra	3
1022*+	Plane Trigonometry	3
1023	College Algebra and Trigonometry	5
1029	Introduction to Contemporary Mathematics	3
1100*+ (1101)	The Nature of Mathematics	3
1431*+	Calculus with Business and Economic Applications	3
1435	Mathematics for Business Analysis	3
1441	Calculus with Application to Technology	3
1550*+ (1551)	Analytic Geometry and Calculus I	5
1552*+ (1553)	Analytic Geometry and Calculus II	5

(table continues)

Area/Course Number	Title	Semester Hours
	Philosophy	
	1021*+ Introduction to Philosophy: Elementary Logic	3
	2010 Introduction to Symbolic Logic	3
III.	Arts	3
	Architecture	
	2401*+ Appreciation of Architecture	3
	3005* History of Architecture I	3
	3006 History of Architecture II	3
	Art	
	1001*+ Introduction to Fine Arts	3
	1011 Art Structure	3
	1440 (1441) Historical Survey of the Arts	3
	2401 Art of the Ancient Near East and Egypt	3
	2411 Oriental Art	3
	2470 Survey of 20th Century Art	3
	Music	
	1751* (1752) Music Appreciation	3
	1753 Survey of Music History I	3
	1754 Survey of Music History II	3
	1799 Rudiments of Music	3
	2000*+ History of Jazz	3
	Philosophy	
	2023 Philosophy of Art	3
	Theatre	
	1020* (1021) Introduction to Theatre	3
	2028* Introduction to Dramatic Literature	3
IV.	Humanities	9
	African & African American Studies	
	1001 Elementary Swahili Language/Culture I	4
	1002 Elementary Swahili Language/Culture II	4

(table continues)

Area/Course Number	Title	Semester Hours
2003	Intermediate Swahili Language/Culture III	4
2004	Intermediate Swahili Language/Culture IV	4
Arabic		
1101 (1102)	Beginning Arabic	4
Chinese		
1101 (1102)	Beginning Mandarin Chinese	5
2001 (2002)	Intermediate Mandarin Chinese	3
Classical Studies		
3020	Classical Epic in Translation	3
3032	Greek and Roman Tragedy in English Translation	3
3040	Greek and Roman Comedy in English Translation	3
Communication Disorders		
2050*	Introduction to Language	3
Construction Management		
1000	Construction and Culture	3
English		
2024 (2824)	Critical Strategies	3
2025*+	Fiction	3
2027*+	Poetry	3
2029*	Drama	3
2123*+ (2823)	Studies in Literacy Traditions and Themes	3
2148*	Shakespeare	3
2300 (2824)	Interpreting Discourse	3
2593*	Images of Women: An Introduction	3
2673*+	Literature and Ethnicity	3
3020*	British Literature I: Middle Ages, Renaissance, and 18th Century	3
3022	British Literature II: Romantics, Victorians, And Moderns	3
3070	American Literature I: Forging a Nation	3
3072*	American Literature II: Coming of Age	3

(table continues)

Area/Course Number	Title	Semester Hours
French		
1001 (1002)*+	Elementary French	4
1050*+	Elementary French	5
2101* (2102)*	Intermediate French	3
2155*+	Readings in French Literature	3
3071 (3072)	Survey of French Literature	3
3080	French Culture and Civilization	3
German		
1101 (1102)	Elementary German	4
2090	Germanic Mythology	3
2101 (2102)	Intermediate German	3
2155	Readings in German Literature	3
3083	Survey of German Literature 1830-1890	3
3084	Survey of German Literature 1890-Present	3
Greek		
1001	Elementary Greek	5
2051	Intermediate Greek	5
2053	Homer	3
2055	Greek Drama	3
History		
1001* (1002)	Western Civilization to 1500	3
1003* (1004)	Western Civilization since 1500	3
1007	World History since 1500	3
2001	The Ancient Near East and Greece	3
2002	Rome Republic and Empire	3
2011	England: Roman Times through 1688	3
2012	Britain from 1689 to the Present	3
2021 (2022)	Modern Europe	3
2055* (2056)	The United State to 1865	3
2057* (2058)	The United States from 1865 to the Present	3
2061	African American History	3
2085	Colonial Latin America	3
2086	Latin America since Independence	3
2095	East Asian Civilization to 1800	3
2096	East Asian Civilization since 1800	3

(table continues)

Area/Course Number	Title	Semester Hours
Honors		
1001	Seminar in Ancient Western Civilization	3
1003	Lectures in Ancient Western Civilization	3
1101	Seminar in Comparative Civilizations	3
1103	Lectures in Comparative Civilizations	3
2002	Seminar in Roman & Medieval Civilization	3
2004	Lectures in Roman & Medieval Civilization	3
2012*	The 19th Century	3
2013*	The 20th Century	3
3001	European Civilization from 1500 to 1789: The Old Regime	3
3003	Western Civilization from 1789: Modern World	3
Italian		
1001 (1002)*+	Elementary Italian	4
2101 (2102)	Intermediate Italian	3
2155	Readings in Italian Literature	3
3001	Italian Culture and Civilization	3
3071 (3072)	Survey of Italian Literature	3
Japanese		
1001 (1002)	Beginning Japanese	5
2001 (2002)	Intermediate Japanese	3
Landscape Architecture		
1150*	Views of the American Landscape	3
Latin		
1001*	Elementary Latin	5
2051* (2053)*	Intermediate Latin	5
2065	Golden Age Narrative Poetry	3
2066	Golden Age Prose	3
2074	Golden Age Lyric Poetry	3
4010	Survey of Latin Literature	3
Mass Communication		
2000*+	Introduction to Mass Communication	3

(table continues)

Area/Course Number	Title	Semester Hours
Philosophy		
1000*	Introduction to Philosophy	3
2020	Ethics	3
2024	Philosophy in Literature	3
2028	Philosophy of Religion	3
2033 (2034)	History of Ancient & Medieval Philosophy	3
2035 (2036)	History of Modern Philosophy	3
Religious Studies		
1003* (1015)	Introduction to Religion	3
1004	Old Testament	3
1005 (1006)	New Testament	3
2001	Faith and Doubt	3
2027	Eastern Religions	3
2028	Philosophy of Religion	3
2029*+	Judaism, Christianity, and Islam	3
Russian		
1001	Elementary Russian	5
2051 (2053)	Intermediate Russian	5
2055	Readings in Russian	3
2075	Introduction to Russian Culture & Civilization	3
4081	Russian Literature in Translation: 19th Century	3
Spanish		
1101* (1102)*+	Elementary Spanish	4
2101* (2103)	Intermediate Spanish	3
2102*+ (2104)	Intermediate Spanish	3
2155	Readings in Spanish Literature	3
3043	Introduction to Latin American Literature I	3
3044	Introduction to Latin American Literature II	3
3071 (3072)	Survey of Spanish Literature	3
Speech Communication		
2010*+	Interpersonal Communication	3
2040	Introduction to Performance Literature	3
2060*+	Public Speaking	3
2063	Argument and Debate	3
2862	Honors: Contemporary Public Address	3

(table continues)

Area/Course Number	Title	Semester Hours
	Swahili	
	1001 Elementary Swahili Language/Culture I	4
	1002 Elementary Swahili Language/Culture II	4
	2003 Intermediate Swahili Language/Culture III	4
	2004 Intermediate Swahili Language/Culture IV	4
	Women's and Gender Studies	
	2500* Introduction to Women's & Gender Studies	3
V.	Natural Sciences	8-9
	Agriculture	
	1005 Science and Society	3
	Agronomy	
	1001 Introduction to Managed Plant Systems In the Modern World	3
	Astronomy	
	1101*+ The Solar System	3
	1102 Stellar Astronomy	3
	1008 (1109) Astronomy Laboratory	1
	Biological Sciences	
	1001* (1002)* General Biology	3
	1005 Introductory Biology Laboratory	2
	1011 Microorganisms and Man	3
	1012 Microorganisms and Man Laboratory	1
	1201* (1202) Biology for Science Majors	3
	1208 (1207) Biology Laboratory for Science Majors	1
	1402 General Plant Biology	4
	1502* (1503) Introductory Zoology	3
	1509 Introductory Zoology Laboratory	1
	Chemistry	
	1001 (1002) General Chemistry for Nonscience Majors	3
	1201* (1202)*+ Basic Chemistry	3
	1212 Basic Chemistry Laboratory	2
	1421 (1422) Honors: Introductory Chemistry	3

(table continues)

Area/Course Number	Title	Semester Hours
Fisheries		
1001	Natural Resource Conservation	3
Geography		
2050*+	Physical Geography: The Atmosphere	3
2051*+	Physical Geography: Land and Water Surfaces, Plant and Animal Realms	3
Geology		
1001* (1002)	General Geology: Physical	3
1003 (1004)	General Geology: Historical	3
1066	Dinosaurs, Catastrophes, & Extinctions	3
1601	Physical Geology Lab	1
1602	Historical Geology Lab	1
Honors		
1007 (1008)	Introduction to Life Sciences	4
Nuclear Science		
2051	Introduction to Nuclear Science	3
Oceanography and Coastal Sciences		
1005 (1006)	Introduction to Oceanography	3
Physical Science		
1001 (1002)	Physical Science	3
Physics		
1100	Introduction to Physics	3
1201 (1202)	General Physics for Physics Majors	4
1208 (1209)	General Physics Laboratory for Physics Majors	1
2001* (2002)*	General Physics	3
2101* (2102)*	General Physics for Technical Students	3
2108	Introductory Physics Laboratory	1
2109	General Physics Laboratory	1
2401	Introduction to Concepts in Physics	3

(table continues)

Area/Course Number	Title	Semester Hours
VI. Social Sciences		6
Anthropology		
1001*	Introduction to Physical Anthropology And Prehistory	3
1003*	Introduction to Cultural and Social Anthropology	3
2015	Introduction to Archaeology	3
2050	World Archaeology	3
2051*	Introduction to World Ethnography	3
2423	Introduction to Folklore	3
Economics		
2010*	Economic Principles and Problems	3
2020*	Economic Principles and Problems (cont.)	3
2030* (2031)	Economic Principles	3
English		
2423	Introduction to Folklore	3
Geography		
1001*+	Human Geography: Americas and Europe	3
1003*+	Human Geography: Africa and Asia	3
German		
2075	German Civilization	3
Honors		
1003	Lectures in Ancient Western Civilization	3
1103	Lectures in Comparative Civilizations	3
2004	Lectures in Roman & Medieval Civilizations	3
2012	The 19th Century	3
2013	The 20th Century	3
3001	European Civilization from 1500-1789: The Old Regime	4
3002	Western Civilization form 1789: The Modern World	4

(table continues)

Area/Course Number	Title	Semester Hours
Political Science		
1001	Fundamental Issues of Politics	3
2051*+ (2052)	American Government	3
2053	Contemporary Political Systems	3
2057*+	Introduction to International Politics	3
2060	Introduction to Political Theory	3
Psychology		
2000*+ (2001)	Introduction to Psychology	3
2004	Psychology of Adjustment	3
3081*+	Personality	3
Sociology		
1001	Human Societies	3
2001* (2002)	Introductory Sociology	3
2411	Industrial Sociology	3
3601*	Social Interaction	3
4111	Development of Social Thought	3

* Indicates course taught Summer 1999
+Indicates courses utilized in sample

APPENDIX B:

LETTER TO FACULTY SOLICITING PARTICIPATION

Table B.1

Letter to Faculty Soliciting Participation
Note: This letter was contained to a single page with an attached consent form. Inclusion here has lengthened it to two pages with an attachment.

Campus Correspondence

TO: LSU Faculty Members Teaching General Education Classes Summer 1999

FROM: Claire Bienvenu; Instructor/Counselor
LSU Ronald E. McNair Program

RE: Dissertation Research

DATE: June 11, 1999

I am a doctoral student in the Department of Educational Leadership, Research, and Counseling. I am conducting a study to fulfill the dissertation requirement for the doctoral degree and plan to collect my data this summer. I am contacting you to request your assistance with this study. My research is an attempt to ascertain the level of decision certainty students experience in relation to the selection of the undergraduate major. For example, why are some students so strongly committed to a major program of study while other students change majors many times? What factors contribute to the strength on students decidedness or undecidedness?

Specifically, I am interested in the relationship between decision certainty and the variables of locus of control, self-efficacy, and self-appraisal within the decision making process of students at various levels of degree completion. For this reason, students from all classifications (i.e. senior, junior, etc.) will be ulitilized in the sample. The study is consistent with the IRB Guidelines for using human subjects and student participation will be voluntary. In order to obtain a representative sample of all LSU students, the decision to survey students in courses that fulfill the general education requirements for graduation was made. As a faculty member teaching such a course this summer, I am contacting you to solicit your participation in the study.

A random sample will be drawn from the courses of faculty who granted permission to participate in the study. So, even if you agree to participate, your class may not be selected as part of the final sample. However, if selected, I will need your assistance to collect data via a survey instrument during any class period of the course you are offering. I will provide you with the instrument packet that will contain the instructions, consent forms, and the survey. The survey task for students will require approximately 20 minutes to complete. The survey can be given any time during the semester at your convenience.

Whatever your decision, **please complete and return the enclosed form to me no later than June 18, 1999** via fax at 388-4320 or campus mail at LSU McNair Program; 111 Johnston Hall.

Please contact me by phone at 388-4322 or E-mail at *cbienv1@lsu.edu* if you have questions or need clarification about the study. I appreciate your assistance in helping me with this process and am willing to provide you with an executive summary of the study findings if you are interested.

Thank you for your attention and hopefully your assistance in supporting this study.

Table B.2

Letter to Faculty Soliciting Participation: Attached Consent Form

Faculty Participation Consent Form

Title of Study: A Study of Psychosocial Factors Related to Decision Certainty in the Major Selection Process of College Students

Course Name/Section: _____

Faculty Member/Instructor's Name: _____

I grant permission for my class to voluntarily participate in the study as described.

Yes _____ **No** _____

_____

Signature of Faculty Member/ Instructor

Please complete this form and return by June 18, 1999 via fax 388-4320 or campus mail to:

Claire Bienvenu
LSU McNair Program
111 Johnston Hall
Baton Rouge, LA 70803

APPENDIX C:

SET OF MEASURES, LETTERS OF INSTRUCTION FOR FACULTY, STUDENT CONSENT FORM

Table C.1

Set of Measures Administered to all Student Sample

Note: The original instrument was to be electronically scanned and was printed on seven letter size pages. The questionnaire is formatted her to integrate with the entire document.

UNDERGRADUATE STUDENT OPINIONNAIRE

Background Information

Last Four Digits of Social Security Number: _____

Course Call Number: _____

Age: _____

Gender: Female _____ Male _____

Race: Black _____ White _____ Hispanic _____
Native American _____ Asian _____ Other (Please specify) _____

Marital Status: _____Single _____Married _____Other

Do you have children? Yes _____ No _____

High School GPA (on four point scale): _____

College GPA (on four point scale): _____

Classification: Freshman ____ Sophomore ____ Junior ____ Senior ___ Other____

College: Junior Division _____Arts and Sciences _____
Basic Sciences _____ Agriculture _____
Business _____ Mass Communication _____
Engineering _____ Education _____
Design _____ Music _____

Are you in the Honors College? Yes _____ No _____

What is the highest level of education obtained by parents?

(Answer one for each parent).	Father or male guardian	Mother or female guardian
less than high school graduation	( )	( )
graduated from high school but did not go any further	( )	( )
went to vocational, trade or business school after high school	( )	( )
attended college but did not earn a degree	( )	( )
attended college and earned an associate (2 year) degree	( )	( )
attended college and earned a bachelor (4 year) degree	( )	( )
attended graduate school	( )	( )
attended graduate school and earned a master's degree	( )	( )
attended graduate school and earned a doctorate degree	( )	( )

Do you receive financial assistance to attend LSU? Yes _____ No _____

If yes, check all that apply.

TOPS Scholarship _____ TAP Scholarship _____ GI Bill _____
Pell Grant _____ Student Loans _____ Other _____

Do you currently live on campus? Yes _____ No _____

If you have or will attend LSU during the regular academic year, did or will you live on campus? Yes _____ No _____

If no, check where you will live

_____ an apartment or house off campus alone
_____ an apartment or house off campus with parents
_____ an apartment or house off campus with spouse
_____ an apartment or house off campus with other students

In which semester did you first declare a major? (Mark one)

_____ 1st _____ 2nd _____ 3rd _____ 4th _____ 5th
_____ 6th _____ 7th _____ 8th _____ Have not declared a major

If you have formally declared a major with the University, please fill in your current three or four letter major code. _____

Have you ever changed your major? Yes _____ No _____

If yes, indicate how many times _____

Please list past majors: _____ _____ _____

Reasons for changing major: Mark all that apply

Change in career decision ( )
Pressure from parents ( )
Could not get into selective program ( )
Major wasn't what I expected it to be ( )
Low salary ranges ( )
Curriculum was too difficult ( )
Past major took too long to complete ( )
My academic advisor suggested it ( )
Bad job market outlook ( )

STUDENT OPINIONNAIRE I

Instructions: Please read each statement below carefully and indicate how much confidence you have that you could accomplish each of these tasks by marking your answer according to the 5 point key below. Mark your answer by completely filling in one and only one circle on the answer sheet. USE A NUMBER 2 PENCIL ONLY.

1 = No Confidence at All 2 = Very Little Confidence 3= Moderate Confidence
4 = Much Confidence 5 = Complete Confidence

How much confidence do you have that you could:

1.	List several majors that you are interested in.	① ② ③ ④ ⑤
2.	Find information in the library about occupations you are interested in.	① ② ③ ④ ⑤
3.	Select one major from a list of potential majors are considering.	① ② ③ ④ ⑤
4.	Make a plan of your goals for the next five years.	① ② ③ ④ ⑤
5.	Determine the steps to take if you are having academic trouble with an aspect of your chosen major.	① ② ③ ④ ⑤
6.	Accurately assess your abilities.	① ② ③ ④ ⑤
7.	Find information about companies who employ people with college majors in English.	① ② ③ ④ ⑤
8.	Select one occupation from a list of potential occupations you are considering.	① ② ③ ④ ⑤
9.	Determine the steps you need to take to successfully complete your chosen major.	① ② ③ ④ ⑤

10.	Persistently work at your major or career goal even when you get frustrated.	① ② ③ ④ ⑤
11.	List several occupations that you are interested in.	① ② ③ ④ ⑤
12.	Find information about educational programs in engineering.	① ② ③ ④ ⑤
13.	Choose a career that will fit your preferred lifestyle.	① ② ③ ④ ⑤
14.	Prepare a good resume.	① ② ③ ④ ⑤
15.	Change majors if you did not like your first choice.	① ② ③ ④ ⑤
16.	Determine what your ideal job would be.	① ② ③ ④ ⑤
17.	Talk to a faculty member in a department you are considering for a major.	① ② ③ ④ ⑤
18.	Make a career decision and then not worry about whether it was right or wrong.	① ② ③ ④ ⑤
19.	Get letters or recommendation from your professor.	① ② ③ ④ ⑤
20.	Change occupations if you are not satisfied with one you enter.	① ② ③ ④ ⑤
21.	Decide what you value most in an occupation.	① ② ③ ④ ⑤
22.	Ask a faculty member about graduate schools and job opportunities in your major.	① ② ③ ④ ⑤
23.	Choose a major or career that your parents do not approve of.	① ② ③ ④ ⑤
24.	Get involved in a work experience relevant to your future goals.	① ② ③ ④ ⑤
25.	Resist attempts of parents or friends to push you into a career or major you believe is beyond your abilities.	① ② ③ ④ ⑤
26.	Figure out whether you have the ability to successfully take math courses.	① ② ③ ④ ⑤

27.	Describe the job duties of the career/occupation you would like to pursue.	① ② ③ ④ ⑤
28.	Choose a career in which most workers are the opposite sex.	① ② ③ ④ ⑤
29.	Find and use the Placement Office on campus.	① ② ③ ④ ⑤
30.	Move to another city to get the kind of job you really would like.	① ② ③ ④ ⑤
31.	Determine the academic subjects you have the most ability in.	① ② ③ ④ ⑤
32.	Find out the employment trends for an occupation in the 2000-2010's.	① ② ③ ④ ⑤
33.	Choose a major or career that will fit your interests.	① ② ③ ④ ⑤
34.	Decide whether or not you will need to attend graduate or professional school to achieve your career goals.	① ② ③ ④ ⑤
35.	Apply again to graduate school after being rejected the first time.	① ② ③ ④ ⑤
36.	Determine whether you would rather work primarily with people or with information.	① ② ③ ④ ⑤
37.	Find out about the average yearly earnings of people in your future career.	① ② ③ ④ ⑤
38.	Choose a major or career that suits your abilities.	① ② ③ ④ ⑤
39.	Plan course work outside of your major or career alternative if you are unable to get your first choice.	① ② ③ ④ ⑤
40.	Identify some reasonable major or career alternatives if you are unable to get your first choice.	① ② ③ ④ ⑤
41.	Figure out what you are and are not ready to sacrifice to achieve your career goals.	① ② ③ ④ ⑤

42.	Talk with a person already employed in the field you are interested in.	① ② ③ ④ ⑤
43.	Choose the best major for you even if it took longer to finish your college degree.	① ② ③ ④ ⑤
44.	Identify employers, firms, institutions relevant to your career possibilities.	① ② ③ ④ ⑤
45.	Go back to school to get a graduate degree after being out of school 5-10 years.	① ② ③ ④ ⑤
46.	Define the type of lifestyle you would like to live.	① ② ③ ④ ⑤
47.	Find information about graduate or professional schools.	① ② ③ ④ ⑤
48.	Choose the major you want event though the job market is declining with opportunities in this field.	① ② ③ ④ ⑤
49.	Successfully manage the job interview process.	① ② ③ ④ ⑤
50.	Come up with a strategy to deal with flunking out of college.	① ② ③ ④ ⑤

STUDENT OPINIONNAIRE II

Instructions: Please read each statement below carefully and indicate the degree each statement applies to you by marking your answer according to the 4 point key below. Mark your answer by completely filling in one and only one circle on the answer sheet.

1 = None 2 = A Little 3 = Some 4 = A Large Amount

1:	How much energy/effort do you put forth to accomplish your current declared academic major ***OR*** to obtain information about a possible academic major course of study?	① ② ③ ④
2:	If there are difficult or uncertain obstacles to overcome in accomplishing your current declared academic major *** OR*** to obtain information about a possible academic major course of study, how much persistence/perseverance do you put forth to accomplish your academic major goal(s)?	① ② ③ ④

3: To what extent would failure to accomplish your academic major goal(s) ***OR***your goal(s) to obtain information about a possible academic major course of study result in DECREASING EFFORT(S) to accomplish future academic major goal(s)? ① ② ③ ④

STUDENT OPIONNIAIRE III

Instructions: Please read each statement below carefully and indicate how much you agree or disagree with each statement by marking your answer according to the 4 point key below. Mark your answer by completely filling in one and only one circle on the answer sheet.

1 = Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree

1. I spend a lot of time thinking about how my current (or potential) academic major matches my personal needs, abilities and interests? ① ② ③ ④

2. I am always courteous, even to people who are disagreeable. ① ② ③ ④

3. I frequently discuss with others whether I have made (or will make) an academic major decision that best reflects my capabilities and career aspirations. ① ② ③ ④

4. I am always attentive to the person I am with. ① ② ③ ④

5. I frequently think about the positive and negative aspects of my current (or potential) academic major. ① ② ③ ④

6. I would never think of letting someone else be punished for my wrong doing. ① ② ③ ④

7. When presented with new information about my current (or potential) academic major, I attend to it quickly/carefully to decide how it meets my personal values and career goals. ① ② ③ ④

8. I am sometimes irritated by those who ask favors of me. ① ② ③ ④

9. Before I made (or make) a decision about my academic major, I spent (or will spend) a lot of time considering alternatives to, and consequences of this decision, a these personally effect (or will effect) me. ① ② ③ ④

10. I am quick to admit making a mistake. ① ② ③ ④

STUDENT OPINIONNIARE IV

Instructions: Please read each statement below carefully and **INDICATE THE SENTENCE IN EACH PAIR (A OR B) WITH WHICH YOU MOST STRONGLY AGREE. ONLY MARK ONE ANSWER FOR EACH PAIR.** Mark your answer by completely filling in the one circle on the answer document

1. O a. Many of the unhappy things in people's lives are partly due to bad luck.
   O b. People's misfortunes result from the mistakes they make.

2. O a. One of the major reasons why we have wars is because people don't tale enough interest in politics.
   O b. There will always be wars, no matter how hard people try to prevent them.

3. O a. In the long run people get the respect they deserve in this world.
   O b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

4. O a. The idea that the teachers are unfair to students is nonsense.
   O b. Most student's don't realize the extent to which their grades are influenced by accidental happenings.

5. O a. Without the right breaks one cannot be an effective leader.
   O b. Capable people who fail to become leaders have not taken advantage of their opportunities.

6. O a. No matter how hard you try some people just don't like you.
   O b. People who can't get others to like them don't understand how to get along with others.

7. O a. I have often found that what is going to happen will happen.
   O b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

8. O a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
   O b. Getting a good job depends mainly on being in the right place at the right time.

9. O a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
   O b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

10. O a. The average citizen can have an influence in government decisions.
    O b. This world is run by the few people in power, and there is not much the little guy can do about it.

11. O a. When I make plans. I am almost certain that I can make them work.
    O b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

12. O a. In my case getting what I want has little or nothing to do with luck.
    O b. Many times we might just as well decide what to do by flipping a coin.

13. O a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    O b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

14. O a. As far as world affairs are concerned, most of us are the victims of forces beyond we can neither understand, nor control.
    O b. By taking an active part in political and social affairs the people can control world events.

15. O a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
    O b. There really is no such thins as "luck."

16. O a. It is hard to know whether or not a person really likes you.
    O b. How many friends you have depends on how nice a person you are.

17. O a. In the long run the bad things that happen to us are balanced by the good ones.
    O b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

18. O a. With enough effort we can wipe out political corruption.
    O b. It is difficult for people to have much control over the things politicians do in office.

19. O a. Sometimes I can't understand how teachers arrive at the grades given.
    O b. There is a direct connection between how hard I study and the grades I get.

20. O a. Many times I feel that I have little influence over the things that happen to me.
O b. It is impossible for me to believe that chance or luck plays and important role in my life.

21. O a. People are lonely because they don't try to be friendly.
O b. There's not much use in trying too hard to please people, if they like you, they like you.

22. O a. What happens to me is my own doing.
O b. Sometimes I feel that I don't have enough control over the direction my life is taking.

23. O a. Most of the time I can't understand why politicians behave the way they do.
O b. In the long run the people are responsible for bad government on a national as well as on a local level.

STUDENT OPINIONNAIRE V

TO BE COMPLETED ONLY IF YOU HAVE FORMALLY DECLARED A MAJOR WITH THE UNIVERSITY. IF YOU ARE UNDECIDED OR HAVE NOT DECLARED A MAJOR, PLEASE SKIP THIS PART.

Instructions: Please read each statement below carefully and indicate how much you agree or disagree with each statement by marking your answer according to the 4 point key. Mark your answer by completely filling in one and only one circle on the answer sheet.

1 = Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree

1. I frequently think about changing my academic major. ① ② ③ ④

2. I am satisfied with the current academic major I have selected. ① ② ③ ④

3. I would pursue another academic major if I was assured it was easier to accomplish than my current declared academic major. ① ② ③ ④

4. I enjoy the classes I take that are required for my declared academic major. ① ② ③ ④

5 When scheduling classes, I give priority to those that meet the requirements of my academic major. ① ② ③ ④

6.	It would be personally upset me if I was asked to change my current academic major.	① ② ③ ④
7.	If I had a choice of taking a "fun" class or a class that meets requirements of my academic major, I would take the academic major class.	① ② ③ ④
8.	The choice I have made in my academic major will help assure my future happiness.	① ② ③ ④
9.	If I had to make a choice between studying for exams in my academic major courses and elective courses, I would study for exams in my academic major courses.	① ② ③ ④
10.	If I thought I could make more money in a different academic major than my current declared academic major, I would change majors.	① ② ③ ④
11.	When I think about pursuing the requirements of my current academic major, I experience a lot of anxiety and stress.	① ② ③ ④
12.	Given available opportunities, I would (do) try to select extracurricular and work activities that compliment the goal(s) of my declared academic major.	① ② ③ ④
13.	Pursuing my current academic major gives me personal gratification.	① ② ③ ④
14.	Earning a degree in my current academic major will fulfill my more immediate personal and professional needs.	① ② ③ ④
15.	I feel confident that the current academic major I have selected will be my final one.	① ② ③ ④
16.	I felt a sense of personal satisfaction when I finally declared my current academic major.	① ② ③ ④

Table C.2

Instruction Letter to Faculty

Faculty Member: _____
Call Number: _____

Dear Colleague:

Thank you for agreeing to participate in this academic major decision certainty research study. The purpose of this inquiry is to explore relationships between several variables which help to explain the decision making process by which students select a major course of study and the certainty with which the decision is made. The questionnaire is relatively straightforward and should take about fifteen to twenty minutes to complete. The directions for each section should be easy for your students to understand. The instrument was successfully tested with a pilot group of college students from diverse backgrounds.

IN ORDER TO INSURE CONSISTENCY, PLEASE FOLLOW THE STEPS AS SHOWN BELOW:

1. Announce that you have agreed to provide class time for students to complete a survey that will be used in the dissertation research of a LSU graduate student. Note that the survey will take about 15-20 minutes to complete.

2. Explain that participation is voluntary.

3. Announce that LSU requires consent of students be given prior to participating in research conducted on campus.

4. Distribute the consent forms and have students complete them.

5. Collect consent forms, exchanging the instrument packet and a pencil for the form for each student who agrees to participate.

6. Once consent is obtained and materials are distributed, please read these directions:

"Use only a #2 pencil for marking your responses. Do not use a fountain pen, ball point pen, or colored pencil. If you are using a mechanical pencil, make sure it has #2 lead. Fill in only one answer for each item. Make all marks heavy and black. Fill in each circle selected completely, but do not extend your marks outside the circle. Erase any stray marks or smudges. If you change your mind about an answer, erase the first answer completely. Instructions for the questionnaire are at the beginning of each section."

After your students have completed the survey, please contact me at 388-4322 or 926-6509 indicating that the surveys have been completed. I will contact you to arrange to pick up completed materials.

If you would like to receive a summary of the results of this research, please include a written note indicating your request and your campus address.

Again, thank you for your time and assistance. I greatly appreciate your willingness to assist me with my dissertation research.

Sincerely, Claire Bienvenu

Table C.3

Student Consent Form

Note: This form was contained on a single page when distributed. Inclusion here had lengthened it to two pages.

Consent Form

1. Title of Research Study:	Psychosocial Correlates of Decision Certainty in the Academic Major Selection Process of College Students	
2. Project Director(s):	Dr. Chad Ellett	phone number: 388-2488
	Dr. Gary Gintner	phone number: 388-2199
Student Investigator:	Claire Bienvenu	phone number: 388-4322

3. Purpose of the Research:
This study proposes to explore relationships between several variables which help to explain the decision making process by which students select a major course of study and the certainty with which the decision is made.

4. Procedures for the Research:
If you agree to participate in the study you will be asked to complete the following survey. The survey items are designed to gather information about the decision making processes involved in the selection of an academic major. One section is designed to collect information from those who have already selected a major. The survey should take about twenty minutes to complete.

5. Potential Risks:
No risks are associated with completing the survey.

6. Potential Benefits:
It is hoped that data collected will provide new insights about how to better assist students in selecting a major that is best suited to the student and as a result will increase student satisfaction and commitment to that major.

7. Alternative Procedures:
This research does not allow for alterative procedures, however, your participation is entirely voluntary and you may withdraw consent and terminate participation at any time without consequence.

8. Protection of Confidentiality:
Your privacy will be maintained and your identity will not be revealed at any time. Please do not place you name on the survey instrument. Rather, indicate the call number of the course and the last four digits of your social security number. Identifying information will not be included in the results and all data collected will be securely stored at all times.

9. Signature:

"I have been fully informed of the above-described procedure with its possible benefits and risks and I give my permission for participation in the study."

Subject signature	Subject name (please print)	Date

APPENDIX D:

SUMMARY OF PERSONAL CHARACTERISTICS

Table D.1

Profile of Sample by Personal Characteristics of Respondents (n=853)

Characteristics	Frequency	Percentage of Total
Age		
<18	17	8.5
18	110	12.9
19	158	18.6
20	122	14.4
21	101	11.9
22	91	10.7
23	40	4.7
24	29	3.4
25-29	60	7.0
30-45	56	6.6
>45	11	1.3
Frequency Missing	3	---*
Gender		
Female	456	53.8
Male	392	46.2
Frequency Missing	5	---
Race		
African American	159	18.8
White	601	71.2

(table continues)

Characteristics	Frequency	Percentage of Total
Hispanic	22	2.6
Native American	6	.7
Asian American	37	4.4
Other	19	2.3
Frequency Missing	9	---
Marital Status		
Single	753	89.1
Married	74	8.8
Other	18	2.1
Frequency Missing	8	---
Parental Status		
Children	72	8.6
No Children	758	90.2
Frequency Missing	23	---
High School GPA		
3.51 - 4.0	272	33
3.01 - 3.5	235	28.6
2.52 - 3.0	208	25.3
2.02 - 2.5	72	8.7
< 2.02	36	4.4
Frequency Missing	30	---
College GPA		
3.51 - 4.0	135	16.9

(table continues)

Characteristics	Frequency	Percentage of Total
3.01 - 3.5	187	23.5
2.51 - 3.0	232	29
2.01 - 2.5	143	17.9
1.53 - 2.0	70	8.8
<1.53	31	3.9
Classification		
Freshman	174	20.7
Sophomore	212	25.3
Junior	199	23.7
Senior	232	27.7
Other	22	2.6
Frequency Missing	14	---
College		
Agriculture	67	7.9
Arts and Sciences	172	20.4
Basic Sciences	95	11.2
Business	93	11.0
Design	30	3.6
Education	60	7.1
Engineering	68	8.0
Junior Division/General College	207	24.5

(table continues)

Characteristics	Frequency	Percentage of Total
Mass Communication	26	3.1
Music	13	1.5
Frequency Missing	22	---
Honors College		
Yes	28	3.4
No	782	95.1
Frequency Missing	43	---
Father's Education Level		
Attended High School	53	6.4
Earned High School Diploma	148	18
Attended Vocational College	60	7.3
Attended College	122	14.8
Earned Associate's Degree	26	3.2
Earned Bachelor's Degree	215	26.1
Attended Graduate School	20	2.4
Earned Master's Degree	111	13.5
Earned Doctorate Degree	69	8.4
Frequency Missing	29	---
Mother's Education Level		
Attended High School	43	5.2
High School Graduate	172	20.7
Attended Vocational College	58	7.0
Attended College	155	18.7

(table continues)

Characteristics	Frequency	Percentage of Total
Earned Associate's Degree	55	6.6
Earned Bachelor's Degree	186	22.4
Attended Graduate School	35	4.2
Earned Master's Degree	110	13.2
Earned Doctorate Degree	17	2.0
Frequency Missing	22	---
Financial Assistance		
Yes	534	64.6
No	292	35.4
Frequency Missing	27	---
Type of Assistance		
Tops Scholarship	265	49.7**
Pell Grant	173	32.4
TAP Scholarship	24	5.0
Student Loans	279	52.2
GI Bill	52	9.7
Other	155	29.0
Live on Campus- Summer		
Yes	114	13.4
No	737	86.6
Frequency Missing	2	---

(table continues)

Characteristics	Frequency	Percentage of Total
Live on Campus-Academic Year		
Yes	235	28.2
No	598	71.8
Frequency Missing	20	---
Live Off-Campus		
Apartment/House Alone	135	22.1
Apartment/House with Parents	135	22.1
Apartment/House with Spouse	76	12.5
Apartment/House with Students	264	43.3
Semester First Declared Major		
1st	496	58.6
2nd	101	11.9
3rd	81	9.6
4th	43	5.1
5th	26	3.1
6th	11	1.3
7th	6	.7
8th	2	.2
Have Not Declared Major	80	9.5
Frequency Missing	7	---
Have You Ever Changed Major?		
Yes	411	53.7

(table continues)

Characteristics	Frequency	Percentage of Total
No	354	46.3
Frequency Missing	88	---
Reason for Major Change		
Change in Career Decision	269	---***
Pressure from Parents	23	---
Could not get into Selective Program	25	---
Major wasn't what Expected	176	---
Low Salary Ranges	52	---
Curriculum was too Difficult	151	---
Past Major took too Long	99	---
Academic Advisor Suggested it	74	---
Bad Job Market	105	---

* Percentage of total computations did not include figure for reported as missing.
**Percentage totals do not add up to 100 due to multiple answers.
***Percentage totals were not computed due to multiple responses.

Table D.2

Profile of Overall Student Enrollment at LSU for Summer 1999 by Personal Characteristics Undergraduate Enrollment = 8,675

Characteristics	Frequency	Percentage of Total
Age		
16-21	3211	37.01
22-24	2455	28.29
25-29	1478	17.03
30-34	649	7.48
35-39	327	3.76
40-49	405	4.64
50+	152	1.75
Gender		
Female	4587	53.00
Male	4088	47.00
Race		
African American	1118	12.8
White	6412	70.8
Hispanic	207	2.4
Native American	27	.3
Asian	400	4.6
Marital Status		
Single	8511	89.1
Married	164	1.9

(table continues)

Characteristics	Frequency	Percentage of Total
Classification		
Freshman	966	11.1
Sophomore	1542	17.8
Junior	2287	26.1
Senior	3733	43.0
College		
Agriculture	519	5.9
Arts and Sciences	1296	14.0
Basic Sciences	653	8.0
Business	1158	13.3
Design	276	3.2
Education	592	6.8
Engineering	856	9.9
Junior Division/General College	3040	35.0
Mass Communication	231	2.7
Music	54	.6

Source: Louisiana State University and A&M College Enrollment Summaries for the Summer 1999, (6/17/99). Office of Budget & Planning (pp. 3, 4, 17, 23, 38)

APPENDIX E:

SUMMARY OF DESCRIPTIVE STATISTICS

Table E.1

Summary of the Descriptive Statistics for Each Item for the Career Decision Making Self Efficacy Scale (CDMSES) (n= 853)

Item		M	S.D.	%Max*
1.	List several majors that you are interested in.	3.91	1.02	78.2
2.	Find information in the library about occupations you are interested in.	3.92	1.04	78.4
3.	Select one major from a list of potential majors are considering.	4.16	.97	83.2
4.	Make a plan of your goals for the next five years.	3.96	1.08	79.2
5.	Determine the steps to take if you are having academic trouble with an aspect of your chosen major.	3.76	.99	75.2
6.	Accurately assess your abilities.	3.84	.91	76.8
7.	Find information about companies who employ people with college majors in English.	3.07	1.20	61.4
8.	Select one occupation from a list of potential occupations you are considering.	4.04	.91	80.8
9.	Determine the steps you need to take to successfully complete your chosen major.	4.23	.86	84.6
10.	Persistently work at your major or career goal even when you get frustrated.	4.18	.88	83.6
11.	List several occupations that you are interested in.	4.14	.93	82.8
12.	Find information about educational programs in engineering.	3.42	1.19	68.4
13.	Choose a career that will fit your preferred lifestyle.	4.13	.93	82.6
14.	Prepare a good resume.	3.77	1.08	75.4
15.	Change majors if you did not like your first choice.	3.97	1.03	79.4
16.	Determine what your ideal job would be.	4.03	1.02	80.6
17.	Talk to a faculty member in a department you are considering for a major.	4.04	1.04	80.8
18.	Make a career decision and then not worry about whether it was right or wrong.	3.19	1.17	63.8
19.	Get letters or recommendation from your professor.	3.71	1.11	74.2
20.	Change occupations if you are not satisfied with one you enter.	3.71	1.01	74.2
21.	Decide what you value most in an occupation.	4.09	.88	81.8
22.	Ask a faculty member about graduate schools and job opportunities in your major.	4.09	.96	81.8
23.	Choose a major or career that your parents do not approve of.	3.56	1.29	71.2

(table continues)

Item		M	S.D	%Max*
24.	Get involved in a work experience relevant to your future goals.	4.25	.87	85.0
25.	Resist attempts of parents or friends to push you into a career or major you believe is beyond your abilities.	4.13	1.05	82.6
26.	Figure out whether you have the ability to successfully take math courses.	3.97	1.01	79.4
27.	Describe the job duties of the career/occupation you would like to pursue.	4.04	.92	80.8
28.	Choose a career in which most workers are the opposite sex.	3.86	1.06	77.2
29.	Find and use the Placement Office on campus.	3.45	1.22	69.0
30.	Move to another city to get the kind of job you really would like.	4.00	1.10	80.0
31.	Determine the academic subjects you have the most ability in.	4.16	.90	83.2
32.	Find out the employment trends for an occupation in the 2000-2010's.	3.70	1.07	74.0
33.	Choose a major or career that will fit your interests.	4.26	.92	85.2
34.	Decide whether or not you will need to attend graduate or professional school to achieve your career goals.	4.24	.91	84.8
35.	Apply again to graduate school after being rejected the first time.	4.13	1.03	82.6
36.	Determine whether you would rather work primarily with people or with information.	4.26	.87	85.2
37.	Find out about the average yearly earnings of people in your future career.	4.32	.86	86.4
38.	Choose a major or career that suits your abilities.	4.28	.84	85.6
39.	Plan course work outside of your major or career alternative if you are unable to get your first choice.	3.78	.97	75.6
40.	Identify some reasonable major or career alternatives if you are unable to get your first choice.	3.81	.96	76.2
41.	Figure out what you are and are not ready to sacrifice to achieve your career goals.	3.97	.95	79.4
42.	Talk with a person already employed in the field you are interested in.	4.33	.89	86.6
43.	Choose the best major for you even if it took longer to finish your college degree.	4.18	1.02	83.6
44.	Identify employers, firms, institutions relevant to your career possibilities.	4.06	.95	81.2

(table continues)

	Item	M	S.D.	%Max*
45.	Go back to school to get a graduate degree after being out of school 5-10 years.	3.50	1.23	70.0
46.	Define the type of lifestyle you would like to live.	4.47	.79	89.4
47.	Find information about graduate or professional schools.	4.22	.90	84.4
48.	Choose the major you want event though the job market is declining with opportunities in this field.	3.63	1.11	72.6
49.	Successfully manage the job interview process.	3.97	.99	79.4
50.	Come up with a strategy to deal with flunking out of college.	3.41	1.28	68.2

*Percentage of maximum is calculated by dividing the item mean score by the maximum possible score for the item. All Career Decision Making Self-Efficacy Scale items have a maximum possible score of five (5).

Note: Responses were assigned the following values: No Confidence at All = 1, Very Little Confidence = 2, Moderate Conference = 3, Much Confidence = 4, Complete Confidence = 5.

Table E.2

Summary of the Descriptive Statistics for Each Item for the Student Academic Major Self-Efficacy Motivation Scale (SAMSEMS) (n=853)

	Item	M	S.D.	%Max*
1.	How much energy/effort do you put forth to accomplish your current declared academic major ***OR*** to obtain information about a possible academic major course of study?	3.40	.69	85.0
2:	If there are difficult or uncertain obstacles to overcome in accomplishing your current declared academic major ***OR*** to obtain information about a possible academic major course of study, how much persistence/perseverance do you put forth to accomplish your academic major goal(s)?	3.45	.69	86.3
3:	To what extent would failure to accomplish your academic major goal(s) ***OR***your goal(s) to obtain information about a possible academic major course of study result in DECREASING EFFORT(S) to accomplish future academic major goal(s)?	2.47	.94	60.2

*Percentage of maximum is calculated by dividing the item mean score by the maximum possible score for the item. All Student Academic Major Self-Efficacy Motivation Scale items have a maximum possible score of four (4).
Note: Responses were assigned the following values: None = 1, A Little = 2, Some = 3, A Large Amount = 4. However, on item 3, which is worded in the negative, the values were reversed.

Table E.3

Summary of the Descriptive Statistics for Each Item for the Student Academic Self-Appraisal Inventory (SASI) (n=853)

Item		M	S.D.	% Max*
1.	I spend a lot of time thinking about how my current (or potential) academic major matches my personal needs, abilities and interests?	3.27	.76	81.75
2.	I frequently discuss with others whether I have made (or will make) an academic major decision that best reflects my capabilities and career aspirations.	2.98	.88	74.5
3.	I frequently think about the positive and negative aspects of my current (or potential) academic major.	3.29	.73	82.3
4.	When presented with new information about my current (or potential) academic major, I attend to it quickly/carefully to decide how it meets my personal values and career goals.	3.10	.72	77.5
5.	Before I made (or make) a decision about my academic major, I spent (or will spend) a lot of time considering alternatives to, and consequences of this decision, as these personally effect (or will effect) me.	3.08	.77	77.0

*Percentage of maximum is calculated by dividing the item mean score by the maximum possible score for the item. All Student Academic Self-Appraisal Inventory Scale Items have a maximum possible score of four (4).
Note responses were assigned the following values: Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4

Table E.4

Summary of the Frequency Distributions of Each Item for the Internal Versus External Control of Reinforcement Scale (I-ECRS) (n=853)

Item		Frequency	Percentage of Total	Frequency Missing
1.a.*	Many of the unhappy things in people's lives are partly due to bad luck.	92	22.5	
b.	People's misfortunes result from the mistakes they make.	642	75.3	19
2. a.	One of the major reasons why we have wars is because people don't take enough interest in politics.	137	16.1	
b.*	There will always be wars, no matter how hard people try to prevent them.	702	82.3	14
3.a.	In the long run people get the respect they deserve in this world.	331	38.8	
b.*	Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.	514	60.3	8
4. a.	The idea that the teachers are unfair to students is nonsense.	427	50.1	
b.*	Most students don't realize the extent to which Their grades are influenced by accidental happenings.	412	48.3	14
5. a.*	Without the right breaks one cannot be an effective leader.	211	24.7	
b.	Capable people who fail to become leaders have not taken advantage of their opportunities.	629	73.7	13
6. a.*	No matter how hard you try some people just don't like you.	628	73.6	
b.	People who can't get others to like them don't understand how to get along with others.	215	25.2	10
7. a.*	I have often found that what is going to happen will happen.	417	48.9	
b.	Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.	426	49.9	10

(table continues)

Item		Frequency	Percentage of Total	Frequency Missing
8. a.	In the case of the well prepared student there is rarely if ever such a thing as an unfair test.	288	33.8	
b.*	Getting a good job depends mainly on being in the right place at the right time.	550	64.5	15
9. a.	Becoming a success is a matter of hard work, luck has little or nothing to do with it.	234	27.4	
b.*	Many times exam questions tend to be so unrelated to course work that studying is really useless.	609	71.4	10
10.a.	The average citizen can have an influence in government decisions.	462	54.2	
b.*	This world is run by the few people in power, and there is not much the little guy can do about it.	383	44.9	8
11.a.	When I make plans, I am almost certain that I can make them work.	626	73.4	
b.*	It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.	215	25.2	12
12. a.	In my case getting what I want has little or nothing to do with luck.	667	78.2	
b.*	Many times we might just as well decide what to do by flipping a coin.	173	20.3	13
13. a.*	Who gets to be the boss often depends on who was lucky enough to be in the right place first.	148	17.4	
b.	Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.	689	80.8	16
14. a.*	As far as world affairs are concerned, most of us are the victims of forces beyond we can neither understand, nor control.	404	47.4	
b.	By taking an active part in political and social affairs the people can control world events.	436	51.1	13

(table continues)

Item		Frequency	Percentage of Total	Frequency Missing
15. a.*	Most people don't realize the extent to which their lives are controlled by accidental happenings.	531	62.3	
b.	There really is no such thing as "luck."	304	35.6	18
16. a.*	It is hard to know whether or not a person really likes you.	488	57.2	
b.	How many friends you have depends on how nice a person you are.	344	40.3	21
17. a.*	In the long run the bad things that happen to us are balanced by the good ones.	471	55.2	
b.	Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.	363	42.6	19
18. a.	With enough effort we can wipe out political corruption.	290	34.0	
b.*	It is difficult for people to have much control over the things politicians do in office.	545	63.9	18
19. a.*	Sometimes I can't understand how teachers arrive at the grades they give.	172	20.2	
b.	There is a direct connection between how hard I study and the grades I get.	670	78.5	11
20. a.*	Many times I feel that I have little influence over the things that happen to me.	388	45.5	
b.	It is impossible for me to believe that chance or luck plays an important role in my life.	441	51.7	24
21. a.	People are lonely because they don't try to be friendly.	269	31.5	
b.*	There's not much use in trying too hard to please people, if they like you, they like you.	545	63.9	39
22. a.	What happens to me is my own doing.	602	70.6	
b.*	Sometimes I feel that I don't have enough control over the direction my life is taking.	225	26.4	26
23. a.*	Most of the time I can't understand why politicians behave the way they do.	465	54.5	
b.	In the long run the people are responsible for bad government on a national as well as on a local level.	354	41.5	34

*Indicates choice with external orientation

Table E.5

Summary of the Descriptive Statistics for Each Item for the Academic Major Decision Certainty Scale (AMDCS) (n=853)

	Item	M	S.D.	%Max*
1.	I frequently think about changing my academic major.	3.17	.89	79.3
2.	I am satisfied with the current academic major I have selected.	3.44	.71	86.0
3.	I would pursue another academic major if I was assured it was easier to accomplish than my current declared academic major.	3.10	.82	77.5
4.	I enjoy the classes I take that are required for my declared academic major.	3.25	.67	81.3
5	When scheduling classes, I give priority to those that meet the requirements of my academic major.	3.53	.63	88.3
6.	It would be personally upset me if I was asked to change my current academic major.	3.19	.81	79.8
7.	If I had a choice of taking a "fun" class or a class that meets requirements of my academic major, I would take the academic major class.	3.39	.71	84.8
8.	The choice I have made in my academic major will help assure my future happiness.	3.34	.69	83.5
9.	If I had to make a choice between studying for exams in my academic major courses and elective courses, I would study for exams in my academic major courses.	3.49	.62	87.3
10.	If I thought I could make more money in a different academic major than my current declared academic major, I would change majors.	2.95	.83	73.8
11.	When I think about pursuing the requirements of my current academic major, I experience a lot of anxiety and stress.	2.53	.87	63.5
12.	Given available opportunities, I would (do) try to select extracurricular and work activities that compliment the goal(s) of my declared academic major.	3.28	.65	82.0
13.	Pursuing my current academic major gives me personal gratification.	3.37	.63	84.3
14.	Earning a degree in my current academic major will fulfill my more immediate personal and professional needs.	3.28	.69	82.0
15.	I feel confident that the current academic major I have selected will be my final one.	3.38	.73	84.5
16.	I felt a sense of personal satisfaction when I finally declared my current academic major.	3.33	.69	83.4

*Percentage of maximum is calculated by dividing the item mean score by the maximum possible score for the item. All Academic Major Decision Certainty Scale items have a maximum possible score of four (4).
Note: Responses were assigned the following values: 1 Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4. However, on items 1, 3, 10, 11, which were stated in the negative, the values were

Table E.6

Summary of Descriptive Statistics for the Social Desirability Scale (SDS)

Subject		M	S.D.	%Max.
1.	I am always courteous, even to people who are disagreeable.	3.10	.74	77.5
2.	I am always attentive to the person I am with.	3.16	.69	79.0
3.	I would never think of letting someone else be punished for my wrong doing.	3.43	.72	85.8
4.	I am sometimes irritated by those who ask favors of me.	2.32	.81	58.0
5.	I am quick to admit making a mistake.	2.92	.79	73.0

*Percentage of maximum is calculated by dividing the item mean score by the maximum possible score for the item. All Social Desirability Scale Items have a maximum possible score of four (4). Note responses were assigned the following values: Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4

APPENDIX F:

FACTOR ANALYSES TABLES

Table F.1

Summary of Factor Structure Coefficients for Items Retained for the One-Factor Solution for the Career Decision Making Self-Efficacy Scale (CDMSES) (n= 853)

CDMSES Item #	Communality Estimates	1 Factor[a]
1	.18	.42
2	.30	.55
3	.35	.59
4	.34	.58
5	.34	.58
6	.36	.60
7	.17	.42
8	.40	.63
9	.42	.65
10	.41	.64
11	.34	.58
12	.19	.43
13	.46	.68
14	.35	.59
15	.19	.43
16	.38	.62
17	.40	.63

(table continues)

CDMSES Item #	Communality Estimates	1 Factor[a]
18	.23	.48
19	.38	.62
20	.31	.56
21	.45	.67
22	.44	.66
23	.13	.36
24	.42	.65
25	.26	.51
26	.24	.49
27	.49	.70
28	19	.43
29	.24	.49
30	.19	.43
31	.49	.70
32	.37	.61
33	.53	.73
34	.48	.69
35	.38	.62
36	.41	.64
37	.41	.64

(table continues)

CDMSES Item #	Communality Estimates	1 Factor[a]
38	.53	.73
39	.44	.66
40	.45	.67
41	.49	.70
42	.42	.65
43	.31	.56
44	.46	.68
45	.18	.42
46	.31	.56
47	.49	.70
48	.31	.56
49	.44	.66
50	.17	.41
Variance explained[b] = 35.11%		

a. Principal components solution
b. Percentage of item variance explained by the one-factor solution

Table F.2

Summary of Results for Factor Analysis Procedures Completed on Opinionniare III to Confirm the Independence of the Social Desirability Scale (SDS) from the Student Academic Self-Appraisal Inventory (SASI) (n=853)

Opinionnaire I Item #	SASI- Factor 1 Coefficients	SDS- Factor 2 Coefficients
1	**.75**	10
2	.08	**.72**
3	**.68**	.13
4	.21	**.65**
5	**.69**	.13
6	.21	**.63**
7	**.69**	.16
8	.11	**-.55**
9	**.69**	.04
10	.26	**.36**

Bold Type indicates item/factor loadings.

Table F.3

Summary of Factor Structure Coefficients for Items Retained for the One Factor Solution for the Social Desirability Scale (SDS) (n=853)

SDS Item #	Communality Estimates	1 Factor[a]
1	.50	.71
2	.49	.70
3	.45	.67
4	.19	-.43
5	.23	.48

Variance explained[b] = 37.26%

a. Principal components solution
b. Percentage of item variance explained by the one-factor solution

Table F.4

Summary of the Rotated Factor Structure for Items Retained on the Four-Factor Orthogonal Solution for the Rotter Internal v. External Control of Reinforcement Scale (I-ELOC) (n=853)

I-ECRS Item #	Communality Estimates[a]	Factor Coefficients I	II	III	IV
1	.39	.08	.13	**.61**	-.04
2	.32	-.13	**.53**	.15	.02
3	.18	.13	.21	-.03	**.34**
4	.23	**.42**	.15	-.13	.12
5	.18	**.34**	.00	.09	.23
6	.41	-.10	.09	.09	**.62**
7	.16	.16	.09	**.35**	.06
8	.38	**.51**	.14	-.25	.18
9	.31	**.53**	.10	.12	.03
10	.51	.29	**.63**	-.15	-.05
11	.19	**.42**	.05	.10	-.01
12	.36	**.54**	.02	.22	-.13
13	.25	**.48**	.01	.12	-.08
14	.48	.30	**.62**	.05	.06
15*	.38	.40	.23	.40	-.02
16	.45	.05	-.08	.01	**.66**
17	.48	-.09	-.06	**.67**	14

(table continues)

I-ECRS Item #	Communality Estimates[a]	Factor Coefficients I	II	III	IV
18	.48	.01	**.67**	.13	.10
19	.29	.53	.04	-.08	.01
20*	.37	.40	.19	.40	.12
21	.33	.04	.04	.06	**.57**
22	.28	**.42**	-.06	.23	.20
23	.24	.08	**.39**	.12	.27
Variance Explained[b]		11.28%	8.32%	6.84%	6.80%
Total Variance Explained[c]	33.24%				

Bold Type indicates item/factor location

*Item loadings do not meet criteria for item retention on factor

a. Sum of squared loadings for this four-factor solution

b. Percentage of item variance explained by each factor

c. Percentage of total item variance explained by the four-factor solution

Table F.5

Summary of the Factor Structure Coefficients for Items Retained for the One-Factor Solution for the Academic Major Decision Certainty Scale (AMDCS) (n=853)

AMDCS Item #	Communality Estimates	1 Factor [a]
1	.31	**.56**
2	.53	**.73**
3	.18	**.42**
4	.28	**.53**
5	.34	**.58**
6	.38	**.62**
7	.30	**.55**
8	.45	**.67**
9	.38	**.62**
10	.14	**.38**
11	.05	.23
12	.30	**.55**
13	.58	**.76**
14	.50	**.71**
15	.53	**.73**
16	.53	**.73**
Variance Explained[b]	36.18%	

Bold Type indicates item loadings which meet criteria established for the item retention

a. Principal components solution

b. Percentage of item variance explained by the one-factor solution

APPENDIX G:

ITEM LOCATION INDEX FOR FACTORED SUBSCALES FOR THE CAREER DECISION MAKING SELF-EFFICACY AND ACADEMIC MAJOR DECISION CERTAINTY MEASURES

Table G.1

Item Location Index for Factored Subscales of the Career Decision Making Self-Efficacy Scale (CDMSES)

CDMSES Subscale, Item Number/Content
Future Orientation (10)*
30. Move to another city to get the kind of job you really would like.
34. Decide whether or not you will need to attend graduate or professional school to a achieve your career goals.
35. Apply again to graduate school after being rejected the first time.
36. Determine whether you would rather work primarily with people or with information.
37. Find out about the average yearly earnings of people in your future career.
42. Talk with a person already employed in the field you are interested in.
43. Choose the best major for you even if it took longer to finish your college degree.
44. Identify employers, firms, institutions relevant to your career possibilities.
46. Define the type of lifestyle you would like to live.
47. Find information about graduate or professional schools.
Self-Determinism (9)
3. Select one major from a list of potential majors are considering.
4. Make a plan of your goals for the next five years.
6. Accurately assess your abilities.
8. Select one occupation from a list of potential occupations you are considering.
9. Determine the steps you need to take to successfully complete your chosen major.

(table continues)

CDMSES Subscale. Item Number/Content
13. Choose a career that will fit your preferred lifestyle.
16. Determine what your ideal job would be.
18. Make a career decision and then not worry about whether it was right or wrong.
27. Describe the job duties of the career/occupation you would like to pursue.
Information Gathering (6)
2. Find information in the library about occupations you are interested in.
7. Find information about companies who employ people with college majors in English.
12. Find information about educational programs in engineering.
14. Prepare a good resume.
28. Find and use the Placement Office on campus.
32. Find out the employment trends for an occupation in the 2000-2010's.
Major Choice (7)
1. List several majors that you are interested in.
15. Change majors if you did not like your first choice.
23. Chose a major or career that your parents do not approve of.
25. Resist attempts of parents or friends to push you into a career or major you believe is beyond your abilities.
26. Figure out whether you have the ability to successfully take math courses.
45. Go back to school to get a graduate degree after being out of school 5-10 years.
48. Choose the major you want even though the job market is declining with opportunities in this field.

*Number of items retained on subscale.

Table G.2

Item Location Index for Factored Subscales of the Academic Major Decision Certainty Scale (AMDCS)

AMDCS Subscale, Item Number/Content
Contentment (8)*
2. I am satisfied with the current academic major I have selected.
4. I enjoy the classes I take that are required for my declared academic major.
6. It would be personally upset me if I was asked to change my current academic major.
8. The choice I have made in my academic major will help assure my future happiness.
13. Pursuing my current academic major gives me personal gratification.
14. Earning a degree in my current academic major will fulfill my more immediate personal and professional needs.
15. I feel confident that the current academic major I have selected will be my final one.
16. I felt a sense of personal satisfaction when I finally declared my current academic major.
Commitment (4)
5. When scheduling classes, I give priority to those that meet the requirements of my academic major.
7. If I had a choice of taking a "fun" class or a class that meets requirements of my academic major, I would take the academic major class.
9. If I had to make a choice between studying for exams in my academic major courses and elective courses, I would study for exams in my academic major courses.
12. Given available opportunities, I would (do) try to select extracurricular and work activities that compliment the goal(s) of my declared academic major.

AMDCS Subscale, Item Number/Content
Uncertainty (3)
3. I would pursue another academic major if I was assured it was easier to accomplish than my current declared academic major.
10. If I thought I could make more money in a different academic major than my current declared academic major, I would change majors.
11. When I think about pursuing the requirements of my current academic major, I experience a lot of anxiety and stress.

*Number of items retained on subscale

VITA

Claire Bienvenu, daughter of Roberta Thomas and C. Thomas Bienvenu, Jr., was born on January 9, 1969, in St. Martinville, Louisiana. Claire is engaged to Frank G. Spiess, III.

Claire graduated in 1987 from St. Martinville High School in St. Martinville, Louisiana. She holds a bachelor of arts degree with a double major in psychology and education from Newcomb College of Tulane University of Louisiana, which she received in 1991. In 1994, Claire completed a master of arts degree in agency counseling at Louisiana State University in Baton Rouge, Louisiana. She also holds a Certificate of Education Specialist in student affairs/college counseling from Louisiana State University in Baton Rouge, Louisiana. In May, 2000, Claire will receive the degree of Doctor of Philosophy in education administration and supervision from Louisiana State University.

Claire has been employed at Louisiana State University since January, 1995. She served first as a freshman counselor in the Freshman College and currently is employed as the instructor and counselor for the Ronald E. McNair Program.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Claire Bienvenu

Major Field: Educational Administration & Supervision

Title of Dissertation: Psychosocial Correlates of Decision Certainty in Academic Major Selection of College Students

Approved:

(co-chair)

(co-chai

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

March 20, 2000